

Sustainable Industry–Academia–Government Collaborative Education Focusing on Advantages of Industry: Long–term Internship after 5years Practice

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ABSTRACT

Practical problem-solving studies in a company or organization have provided great advantages for our university and students. For example, such studies can lead them to build a stronger relationship with local governments and companies as well as develop their research through collaborative studies. On the other hand, comments from companies or organizations that accepted our students showed that they did not always have advantages. This study seeks ways to establish a sustainable long-term internship program that can offer advantages for companies. Advantages and disadvantages of the internship are written by the company on the evaluated sheet. These feedback comments are analyzed by text-mining approach. It is shown that there are three types of company and organizations depending on their reasons for accepting students. Next, suitable internship programs for each type, including their period and expense distribution are presented.

Keywords: Long-term internship, Collaborative evaluation, Graduate students, Text-mining approach

I. Introduction

Japanese Graduate students are overwhelmed in a complex social environment. They are asked to solve problems related to reducing environmental pollution, disasters, responding to diversifying social needs, developing new sources of energy, and maintaining the competitiveness of industry for human family in an age of a shrinking and aging population and declining fertility. Therefore, Japanese engineering graduate students are interested in applying for internship in private industry or the government so that they can see and acquire practical and applicable skills necessary in the future. For quite a long time before the system was established, there were some programs similar to the current internship system. But the term was short (one week or less) and appeared to be like a “facility tour”. Beginning in 2005, the Ministry of Education, Culture, Sports, Science and Technology, Japan (MEXT) began developing a cultivable educational program of practical

engineers for graduate students. The program was introduced at the wish of private industry. The University of Tokushima developed an internship program during 5years from 2006 to 2010. The program was commissioned by MEXT. The Internship Program recommends that cooperative and active learning educational methods may be efficient tools by incorporating practical experience into the graduate and doctoral engineering education curriculum. In addition to this, it is important to foster industrial advantages necessary for continued collaboration in both the public and private sectors. The following study presents findings on a collaborative educational program that involves students in a co-op or internship placement for a 5 year period. The aims of this paper are focused on industrial advantages of cooperation between the University of Tokushima and companies that accepted graduate students in the internship program were looked at in order to what kind of characteristics were successful related to the collaboration.

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II. Reveal Characteristics of “Long-term Internship”

This internship program is called “Long-term internship”. It has three characteristics as follows.

- A. Its term is longer compared with normal internship (which resembles a “facility tour”). The students have to do internship at companies-governments for a period of 270 hours and 3 months. Along with the long-term internship, they also can continue other classes and daily work. With such long internships, we expect that students' will develop their time management, communication and enterprising ability.
- B. If they finish the specified term (270 hours and 3 months), they will gain 4-6 units. Long-term internship is part of the educational curriculum at the University, so the University has to make a contract regarding such internship conditions for the students as a part of the University with his cooperative company. Transportation and accommodation costs are provided by the University. And in a few cases, students are

able to obtain financial backing (airfare, transportation, room or board) from his/her cooperative company. The cooperative company provides a written evaluation of the student's performance at the end of each long-term internship period. The student's teacher provides guidance about research and technical aspects. A coordinator supports the student with any other matters for during his/her internship. Such support includes a wide range of things. For example, before training (business manner, response and use of words, correspondence to strangers, safety), schedule planning, confidentiality, intellectual property right and so-on. The coordinator does not only provide educational support, but also a contract between company and the University with regard to the internship. For example, this may include the student's right and duties, safety, condition, the internship period. In general, when there is a collaborative research agreement between university and company, there is no text explaining about rights and obligations under which a student participates. Therefore, it is uncertain about the student's rights and duties. But, if this internship is put to practical

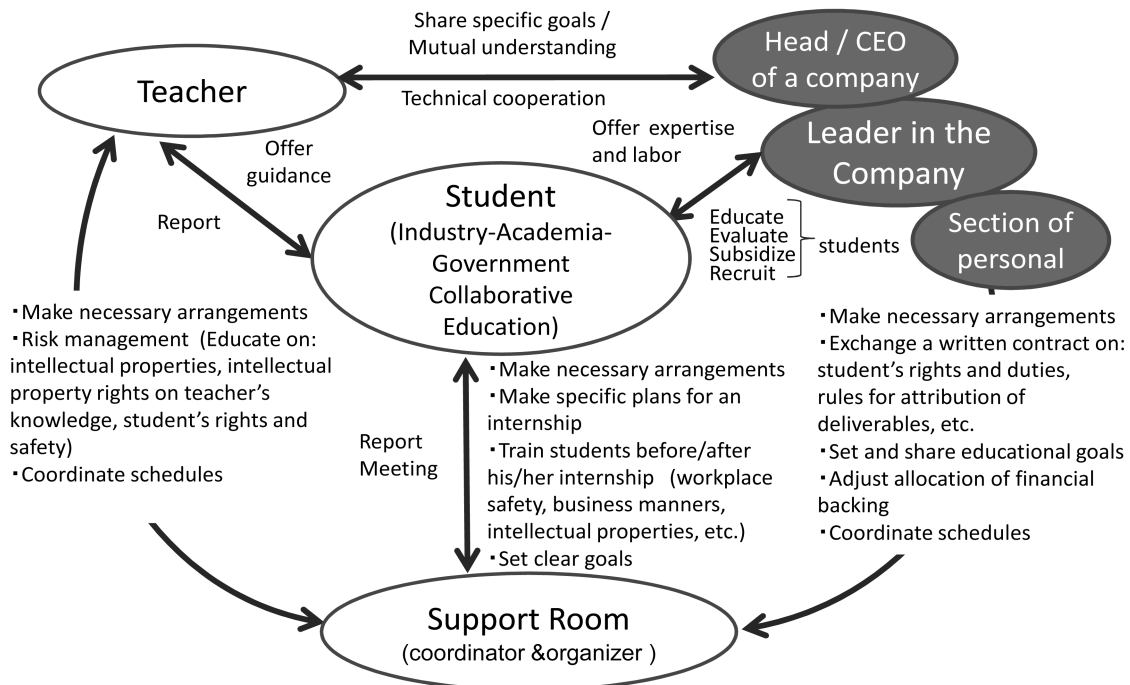


Fig. 1 Long-term Internship Structure1) (Organization and Administration)

use, the teacher and the company may be able to guide the student to clarify or resolve such uncertainties.

C. The students should have the clear training goals and their long-term internship needs to be planned in advance. The University expects that experience will be gained by such collaborative projects from students' training during their internship. It is important that students should take on a variety of roles during the collaborative project. Sometimes they play a central role in solving some problem or task. Such behavior is necessary for the advancement of specific cooperative research projects. During the internship, it is necessary that the coordinator repeatedly interview the student and counsels them in order to give advice to help achieve their goals. Interview subjects should not only be related to research. For example, talking with the leader about own failures, reporting, communicating,

taking counsel, attainment level of their goals and have things to do in the future. This is important because it serves to develop the habit of periodically reporting, communicating and taking counsel. Students have to talk about value of their research with the coordinator. This will make it possible for students to think about significance of the study and corporate social responsibility.

III. Collaborative Education Focusing on Advantages to Companies

1. Advantages and Disadvantages of Cooperative Company

A performance-appraisal sheet is submitted by the company after completion of the internship. Advantages

Table 1 Advantages on Type of Internship Content

Content of Long term internship	Advantage		Improvement in Rate & Quality of Cooperative Research	Publicity of the Company	Employee Training	Contribution to Society	Revitalization in the Office	Intensified the University Cooperation	Procuring Workers	Other
Project Support	Number of Companies	9	6	3	6	0	2	2	2	3
	Perecentage		66.7%	33.3%	66.7%	0.0%	22.2%	22.2%	22.2%	33.3%
Cooperative Tesearch	Number of Companies (Students)	14 (17)	12	2	7	2	12	5	2	1
	Perecentage		85.7%	14.3%	50.0%	14.3%	85.7%	35.7%	14.3%	7.1%
Support of Routine Work	Number of Companies	10	1	4	7	1	6	5	6	2
	Perecentage		10.0%	40.0%	70.0%	10.0%	60.0%	50.0%	60.0%	20.0%
All Cooperative Companies	All	33 (36)	19	9	20	3	20	12	10	6
	Perecentage		57.6%	27.3%	60.6%	9.1%	60.6%	36.4%	30.3%	18.2%

Table 2 Disadvantages on Type of the Internship Contents

Content of Long term internship	Disadvantage		Difficult Schedule Control	Safety	Increased Own Work	Reluctance to Get the student	Can Leak of Company Data	Other
Project Support	Number of Companies	3	0	0	3	1	1	2
	Perecentage	33.3%	0.0%	0.0%	33.3%	11.1%	11.1%	22.2%
Cooperative Tesearch	Number of Companies	5	2	1	1	0	1	1
	Perecentage	35.7%	14.3%	7.1%	7.1%	0.0%	7.1%	7.1%
Support of Routine Work	Number of Companies	5	2	0	5	1	0	0
	Perecentage	50%	20%	0%	50%	10%	0%	0%
All Cooperative Companies	All	13	4	1	9	2	2	3
	Perecentage	39.4%	12.1%	3.0%	27.3%	6.1%	6.1%	9.1%

and disadvantages of the internship are written by the company on this sheet. General collaborative academia makes it difficult for getting honest feedback from the company. Because, they fear that negative relations academic staff. Therefore, these sheets are sent back to the coordinator. And feedback from the company is publicized which making masked data. 33 industries sent feedback from 36 students about “advantages and disadvantages” of their internship. These feedback comments are analyzed by text-mining approach and have been evaluated in the appearance frequency. All companies answered that if conditions allow internship students would be accepted again in the future.

Content of the internship was classified as three categories.

A. Project Support: The student joins a project being carried out in a company. The teacher includes a technical adviser. There is no formal contract between the university and the company. The student provides technical knowledge and links their teacher with the company. And the more the student pursues peripheral business as a part of the project it serves to foster understanding of the related problems.

B. Cooperative Research: The student joins a cooperative research project. The teacher is one of the main members. They are called on to accomplish certain results. The students do an experiment and analysis in the company. And the student and their teacher make sure of current experimental methodology and consider such things in the university. The student

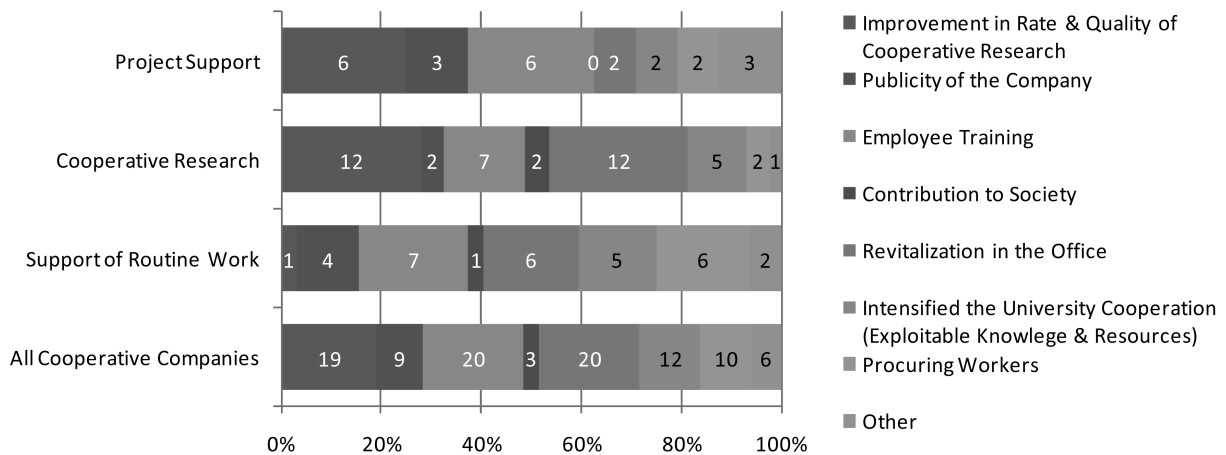


Fig. 2 Advantages on Type of Internship Content (100% Buildup)

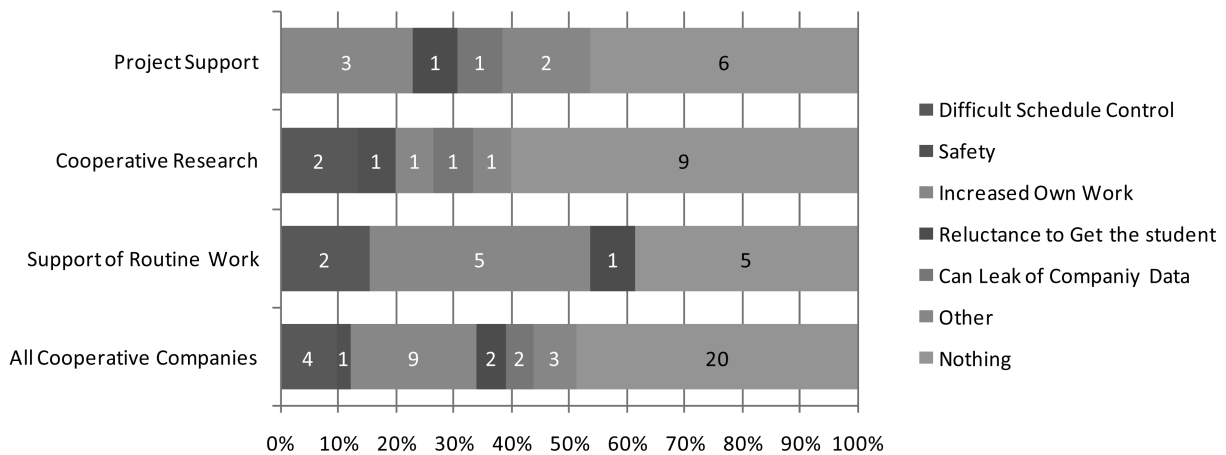


Fig. 3 Disadvantages of Type of Internship Content (100% Buildup)

does not engage in other business.

- C. Support of Routine Work: The student joins to help with routine work at the company. Here, the of the student is to understand application of his/her studies and the necessary specialized knowledge. The teacher does not take part in this work it in many cases.

Table 1 shows “Advantages on Type of the Internship Content”, and Table 2 presents “Disadvantages on Type of Internship Content”.

Fig. 2 shows “Advantages on Type of the Internship Content (100% Buildup)”, and Fig. 3 represents “Disadvantages of Type of Internship Content (100% Buildup)”. These were classified as types of the internship.

2. Expectation for Government in Collaborative Education

Government announced that the enhancement of potential growth in the area of science and technology would become a principal pillar in the policy, “New Growth Strategy–‘Vigorous Japan’ Scenario for Recovery” (bill approved in the Cabinet meeting in June 18th, 2010).

It also showed the concrete measures for promoting further collaborative efforts of industry, academia, and government to cultivate graduate students from universities for science and technology (hereinafter called, “Human Resources with High Level of Education). Following issues have revealed through our 5-year challenges in Graduate School of Advanced Technology and Science in the University of Tokushima. Present issues on Industry–Academia Collaborative Education in graduate school

- A. It is quite difficult to sustain the projects under current circumstances, since most of them have been depending on government subsidies.
- B. There aren’t many specific advantages for industry on collaborating with the university through education.
- C. Evaluation of teacher performance in university is remarkably one-sided on his /her studies, so that assisting researches and writing theses have often resulted in the top priority for graduate students in general, and

unfortunately, the University of Tokushima is no exception. It is necessary to build incentives for teachers to have them get interested in the development of human resources.

As for 1), although donations or financial assistance for universities are still far from adequate in Japan comparing with Western countries, there are some foundations and corporations which support various studies and researches. However, such outside fund for purely educational purposes has only been subsidized by government at present. Under such circumstances, we are fortunate to have been able to receive economic support from a local company. Such support might be less common in other universities in Japan.

However, it is obvious that the financial support by only one company is insufficient for carrying out the ongoing project from the perspective of sustainability in education. We expect government to fulfill their role as a publicity to help socially promote Industry–Academia–Government education and establish organizations or systems to develop it. Particularly, students who finished doctoral courses have been gradually striking out on their career paths to work in the companies which gave them internship opportunities. We earnestly hope to develop and promote the long-term Internship in our university and graduate school in the system of sending competent students to Industry after fostering them at considerable cost and efforts to be capable human resources. In addition, regarding financial supports for students who finish doctoral courses, we would like our government to consider making a system for lending intensive support to them if they reach a certain required level such as setting a limit on making selections.

It is virtually impossible for regional universities to keep in step with the examples of Tokyo-centered Industry–Academia Collaboration. We look forward to a creation and implementation of regional base scheme that continuously accumulate, evaluate, and improve the assets of practical education.

In the case of 2), we will mention later on our trial to clarify the mutual benefit for both industry and academia

following the types of collaboration.

In regard to 3), reform of education in graduate school is currently underway by making efforts day by day to balance competing goals for increasing the number of students up to a fixed number and ensuring the quality of education at the same time. We believe the Industry-Academia Collaborative Education is quite an effective solution to the problem. Even when we deal with education for graduate students as a form of Industry-Academia Collaboration, organizing the evaluation system and support system in our university that is similar to collaborative researches or regional collaboration will be the first step.

IV. Conclusion

It is shown that there are three types of company and organizations depending on their reasons for accepting students. Next, suitable internship programs for each type, including their period and expense distribution are presented. Long-term internship is best achieved by a good coactive relationship between all parties concerned. Feedback comments are an effective improvement method, as described in the following.

- A. Project Support: The most important aspect of internship is matching academic seeds and industrial needs. The internship period tends to be long-term. Therefore, it is necessary for the teacher, student, company and coordinator to discuss a subject for dissertation (master or doctor) in order to fulfill the desired goals
- B. Cooperative Research: This is the best type of internship. Companies aggressively offer financial assistance to the student. The teacher (and the university also) is able to cut down on a burden of risk management. A company may be able to introduce bright students to cooperative research. So the company (spending a relatively short period of time in the company) will actively recruit students, because the internship allows them to understand students' actual level of education and ability. In particular, they are likely to be aggressive about hiring doctoral students. However, it must be noted that it is difficult to obtain internship for the

students who belong to a laboratory that does not have cooperative research or a cooperative company

- C. Support of Routine Work: The student is to have active coordination of their career path. Main collaborative industries are general enterprise, public service corporation, and science research laboratories. The student is able to take part in advanced research, but he or she should be able to become an all-rounder. Important aspects are things such as "the student potentially hopes to work at the company" and "make a preliminary internship plan with the company, and share the theme". So the company (spending a relatively long period of time in the company) will be active recruitment of the student, because this internship allows them to understand students' actual level of education and ability. Finally, it should be noted that one disadvantage is reluctance to get the students as shown in Fig. 3. Therefore, an interview before the internship is necessary. Thereafter, the company to accept or reject the student. Therefore, the important things are screening and training (manner and safety) before the internship.

Long-term internship is best achieved by a good coactive relationship between all parties concerned.

That the relationship between the parties "win-win".

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