

Development of Characteristic Internship Program on Engineering Education

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ABSTRACT

A practice on learn-by-doing career education programs has been operated in Faculty of Engineering in Niigata University from 2006. The purpose of the activity is reduction of early unemployment which is due to the gaps between the situations which university students would expect in their job hunting processes and those of their practical work places after getting jobs. We developed a novel internship program to let the students notice the practical situations of engineers outside the university. A major part of the program is composed of two different kinds of internships and what we call a career design workshop. The characteristic programs are called “Market Internship” and “Technology Internship”. In the activities, they are organically connected with each other. In the paper we refer to one of the unique internship programs “Technology Internship”, which is characterized as a longer-term practice than usual. In the course of one-month internship practices, the students obtained deeper understandings and closer relationship to the practical work places of the companies than usual internships which last less than two weeks. The students estimated these unique experiences effective for their job hunting in near future.

Keywords: Engineering Education

I. Introduction

Education Center for Engineering and Technology(ECET) was organized in Faculty of Engineering in Niigata University in 2004. Since it has been pointed that the educational programs should be reconstructed even in universities, the center takes some roles to organize and conduct various educational reform projects which were adopted by Japanese government[1]. ECET was at first composed of four branches and sustained by fourteen staffs which were assigned by four full-time and additional posts to conduct the programs. We defined a keyword reflecting the ability for engineering design, which consisted of abilities to create and to learn. As shown in Fig. 1, we have conducted several kinds of different reform projects one after another for more than ten years. A novel internship program was developed in the career design program, and has been still continued in the start-up program and the leadership-program even after the

period of the career design program ended.

A learn-by-doing career design program was precisely planned in ECET, and was adapted to the grant-in-aid “Support Program for Contemporary Education Needs” by Ministry of Education, Culture, Sports, Science and Technology(MEXT) of Japanese government in 2006. This program focused on the recent social problems such as increasing NEET (Not in employment, education or training) people[2, 3].

In the paper, the authors discuss the activities of these characteristic internship programs and focus on the “Technology Internship” after a brief introduction of “Market Internship”. In addition, we discuss the roles and effects of the educational human network outside the university with respect to the difference of the consciousness between the social engineers and university students before graduation.

II. A couple of novel internship programs

An engineering education program named as “Practical and Vocational Engineering Education in Cooperation with

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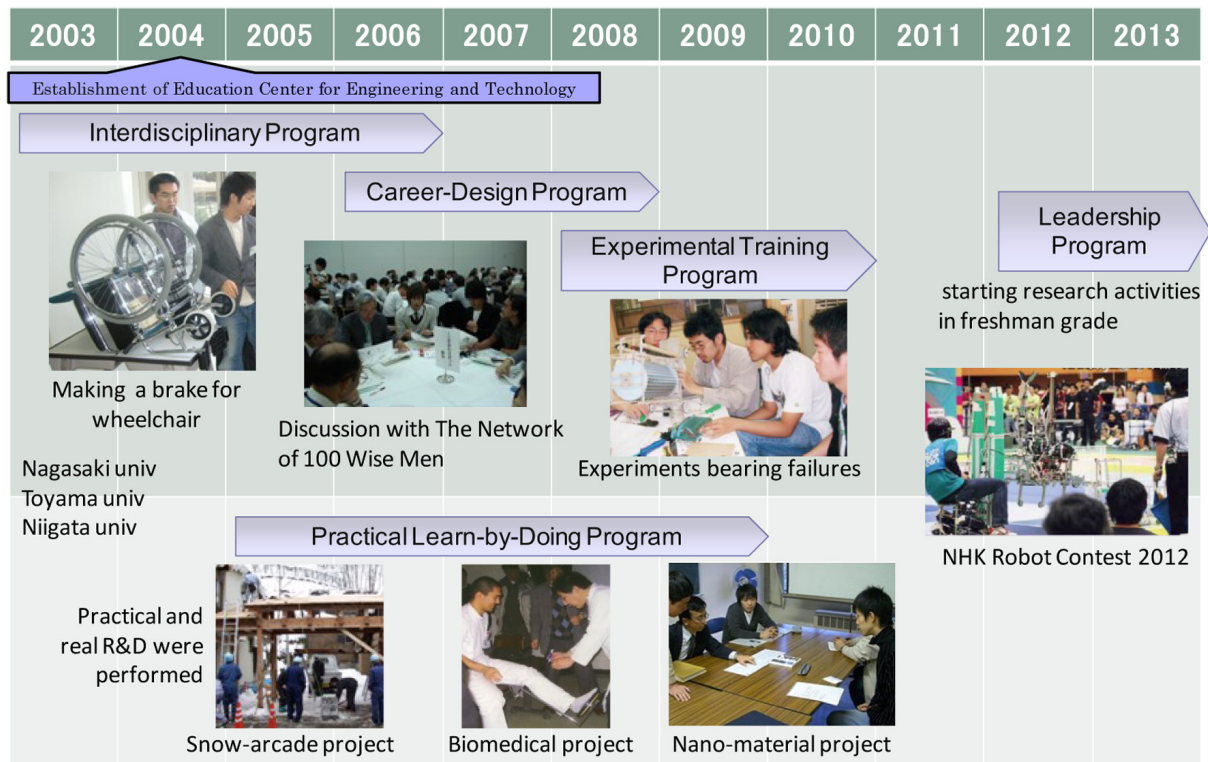


Fig. 1 Educational reform activities granted by Japanese government in Faculty of Engineering of Niigata University

Enterprises” consists of a couple of specific internship programs, “Market internship” and “Technology Internship”, in order to eliminate the discrepancy between the situations students imagine and practical conditions after getting in companies. As shown in Fig. 2, “Market internship (hereafter abbreviated as MI)”, what we call, is one of the novel characteristic internship programs we have developed in the career design program[2]. The students directly approach to the customer, and investigate the problems and merits which reside in the engineering technologies from the users points of view. Fig. 3 shows the examples of the activities which were conducted in 2006. The students visited the

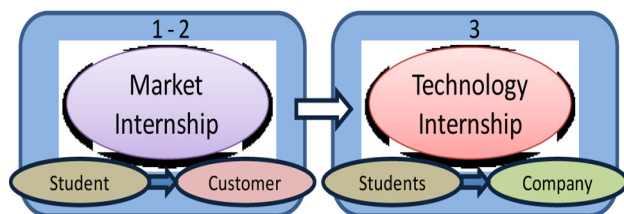


Fig. 2 Novel internship programs organized in the process of educational career design program starting in 2006



Fig. 3 investigation driven by students on industrial waste (a) and town planning (b)

industrial waste treatment factory and the city centre to investigate how the engineering techniques were utilized.

“Technology Internship (TI)” is, in a word, an internship program which is characterized as a long term stay program. The internship programs were prepared and conducted by the regional private companies. In order to let the university students know the companies they would visit, we held the briefing sessions for the companies before the internship programs started with the assistance of Center of Cooperative Research of Niigata University, as shown in Fig. 4. The sessions were held three times for three years in attendance of



Fig. 4 Company briefing session in 2006 (a) and 2010 (b)

Table 1 Number of students who took Market Internship and Technology Internship

	MI	TI	Department(TI)
2006	20	–	–
2007	39	–	–
2008	23	3	E, M, C
2009	12	1	F
2010	4	1	M
2011	14	4	M, I, C
2012	7	1	M
	119	10	

M: Mechanical system, E: Electrical and Electronic, C: Chemical, I: Information, F: Functional Materials, B: Bio-cybernetics

seven, four and four companies in 2008, 2009 and 2010, respectively. The students chose the companies of their tastes and visited the practical work places in the factories and offices. They stayed for a month mainly in summer holidays to experience the practical engineering processes in their way through this program. The long-term stay for a month enabled the students to get deeper understanding of the practical jobs and human relationships in the company without shallow overviews than usual internships which last less than two weeks.

Table 1 shows the number of the students who took the internship programs of MI and TI from the beginning of the activity. In comparison with MI, the students in small number but various departments took the TI program. Following the results of the questionnaires after the internships, the students regarded these experiences as profitable for their activities of job hunting in near future. The program has been successively carried on in the novel educational program called “Smart Dormitory Project” which was adopted by the national government in 2012.

III. Educational supporting organization outside the university

We constructed an organization for educational supports by the engineers and scientists outside the university, which is called “The Network of 100 Wise Men”. We thought it necessary to get some help by well-experienced engineers outside the university for practical education programs when we conduct our educational reform projects, because university professors usually have few experiences on the practical business situations. Specific engineering techniques must reside in the specific engineers or scientists who would have tremendous know-how and forefront knowledge. Then, we organized a novel educational human network by inviting the engineers and scientists among the research partners of existing collaboration activities of all the departments in Faculty of Engineering in our university[4, 5].

As for the education reforms worldwide, one can refer the activities in which the regional industrial communities contribute to educational issues of universities[6]. On the other hand, we expected the individual educational abilities of the engineers in the societies. The members were introduced and chosen mainly by the professors who had been collaborated with each other for years. Since the collaboration projects are originally based on the academic research activities, the network members have strong relationships and reliance to the university professors with each other. We regard this as the most precious among other characteristic features of the network. Fig. 5 shows the meetings of members and faculties, held in 2007 and 2012, respectively. Eighty- seven members have entered the network by 2008, and fifty-four members are lively functioning even now in various educational projects.



Fig. 5 Network members chairing the meeting in 2007 (a) and a view of discussion in 2012 (b)

IV. Presentation meeting

The presentation meetings have been held twice a year in attendance of the network members, faculties, and students. The students reported their investigation results and experiences of MI and TI at the practical places of industrial companies they stayed, as shown in Figs 6 and 7, respectively. The discussion named “Career Design Workshop” was simultaneously conducted among the students, the network members, and faculties. Fig. 8 shows the results of questionnaire from the network members



Fig. 6 A presentation by students reporting the results of Market Internship on new transportation system in Niigata in 2012 (a) and the discussion at the meeting in attendance with students, engineer/scientists, and faculties held in 2012 (b)



Fig. 7 Presentation (a) and discussion (b) with a member of The Network of 100 Wise Men in Technology Internship program in 2012

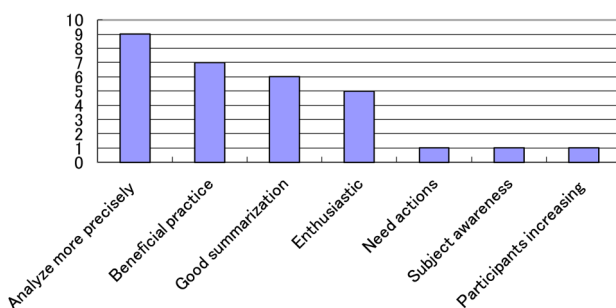


Fig. 8 Advice of the network members to the students at the presentation meeting

who attended the meetings held in 2008. They pointed out the shallow analyses of the students on their activities, while they set high evaluations to their summarization on the reports of their practices.

V. Conclusion

We have developed and conducted a couple of novel characteristic internship programs in our career design programs from 2006. Market Internship(MI) and Technology Internship(TI) were effective for the students to know the gaps between their consciousness and the practical merits and problems the engineering technologies include, and to know more profound understandings of the practical jobs and good relationships to the company workers than ordinary internships which last less than two weeks. According to the results of questionnaire from “The network of 100 Wise Men” at the presentation meetings, the network members required the students more precise analyses on their investigations, while they set high estimation to their summarization skills in these beneficial educational practices.

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