PROJECT-BASED ENGINEERING CAREER EDUCATION PROGRAMS BY THE COLLABORATIONS WITH PRIVATE COMPANIES
--- TO PROVIDE MOTIVATION FOR DEVELOPING SELF-CONSCIOUSNESS ---

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Abstract:

The newly developed education programs including some regular curricula have been conducted with a common idea based on what we call "the ability for engineering" that is defined as abilities to learn and create. The purpose of the activity is reduction of unemployment caused by the discrepancy between the expectation on job hunting and the practical condition after getting job. We refer to the novel education programs on the internship with respect to the reformation of career designing. A major part of the project is composed of two kinds of internship programs and a workshop on career designing. These courses are prepared for the students from 2nd to 4th year grades. One of the most characteristic ideas is the program what we call "Market Internship", which is introduced for the first time in Japan from the view point of the users who are living where the engineering technologies are practically utilized. This program is mainly intended for the 2nd year students. The career design program named "Career Design Workshop" is prepared for the 3rd year students with respect to the discussion by the students, company engineers and faculties. The 4th year students are going to take the "Technology Internship" from the point of view of manufacturers they will be employed in near future. A couple of characteristic programs what we call "Network of 100 Wisdom" and "Enterprise Week" are planned to assist the whole system, as the collaboration with the local companies and the practical career design lectures, respectively.

Introductions

It has been enthusiastically pointed that it is necessary to reform the educational programs in universities. A new Japanese word "*Kougakuryoku*" was defined as an ability for engineering in our activity. The word means the total ability which is required to the university students under the curriculum of engineering, and consists of ability to create and learn. In 2004, Education Center for Engineering and Technology ECET was established in Faculty of Engineering in Niigata University. The center is a novel organization conducting various educational projects [1-3], and organized by thirteen staff and four branches which are assigned by two full-time staff and additional posts to conduct the programs as follows.

A learn-by-doing career educational program has been carefully planned in ECET of Niigata University, and has been adopted to the grant we call "Support Program for Contemporary Education Needs" by Ministry of Education, Culture, Sports, Science and Technology (MEXT) of Japanese government in 2006. This educational program is based on the recent social problem of increasing NEET (Not in employment, education or training).

Fig. 1. The whole concept of novel career design program conducted in Niigata University.

Practical and Vocational Engineering Education in Cooperation with Enterprises

The newly developed program is named as “Practical and Vocational Engineering Education in Cooperation with Enterprises (Students, specialists, and professors working together for professional awareness)”. This program directly relates to the internship programs to deal with the discrepancy between students’ expectation to the job and practical conditions after getting in companies. The whole concept is shown in Fig. 1. The program consists of a couple of internship programs and a workshop discussing on the engineering technologies. The most characteristic program is what we call “Market Internship”, in which the students investigate the problems residing in the engineering technologies from the users view. The discussion among the students, company engineers and faculties, named “Career Design Workshop”, is prepared after the internship program. In the last year grade, the students are going to take the “Technology Internship” from the view point of manufacturers. In order to let the university students experience the practical engineering processes in their easy-understand way, we have proposed a couple of the assisting systems such as the collaboration with the local companies through “Network of 100 wisdom” and the practical career education lectures named “Enterprise week”. The lectures of engineering ethical education named “Technological Ethics Lectures” are planned, aiming to know the compliances with laws.

Consciousness Education at Career Center

Through the lectures by 12 graduates, the Career Center educates the initial grade students with the manners and rules of society such as the meaning of work and the attitude to become a working member of society.

Market Internship

The career education program started in the last half of 2006 fiscal year. Market Internship has been performed twice, Career Design Workshop once, Enterprise Week five times, and Technological Ethics Lectures were held for four times. In the Market Internship, students have experienced the engineering technology from the user's perspective, enabling themselves to find its worth. They have directly interacted with the market and society, experiencing real social needs, realizing new aims and technological problems. The sessions were held in March and September 2007. Forty four students were divided into four groups in March and five groups in September, investigating on the themes of industrial waste, earthquake-stricken area, a wheelchair and barrier-free, streets and houses, and so on from technological viewpoints on products and structures from the user perspective, as shown in Fig. 2. According to the questionnaire after the investigation in March, 73 % of the participants answered the program was profitable and 63 % replied that they were motivated.

Career Design Workshop

A peculiar workshop discussing among the students, company engineers and faculties has been performed in October 2007, as shown in Fig. 3. 73 students divided in 12 teams lively talked to 71 engineers in front of 32 faculties, and discussed the problems that students have found by themselves with respect to each subject. Through this exchange of opinions, a lot of students answered that the meeting was effective for them to motivate themselves toward the engineering technologies.

(a) (b)

Fig. 2. (a) Market Internship and (b) the results of the student questionnaires

Fig. 3. Career Design Workshop

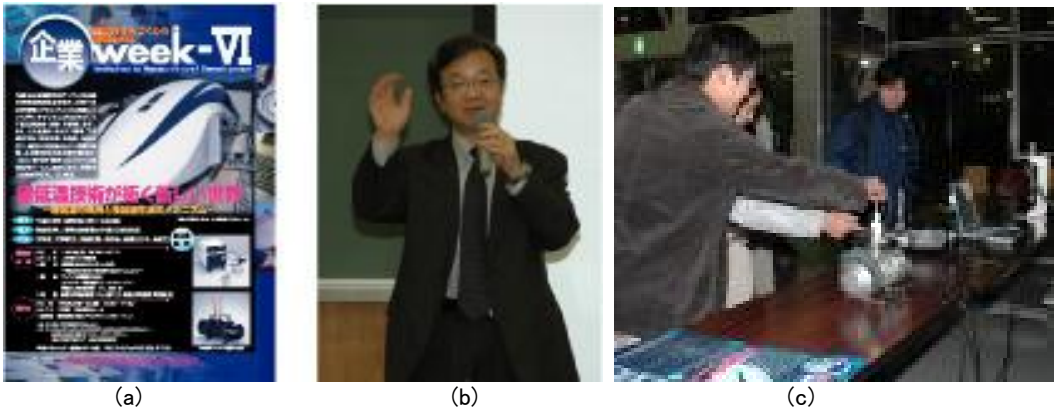
Fig. 4. Conference of Network of 100 Wisdom

Network of 100 Wisdom

Network of 100 wisdom is a supporting system for engineering education. Since the specific techniques always reside in the specific engineers. Since the experienced engineers have tremendous know-how and up-to-date knowledge, we have constructed a kind of the network system of technical information, instead of piling up the know-how on the bookshelves in university. The home page on the internet is shown in Fig. 4. In addition, this network of engineers presents technical information to students and professors to promote the career education such as Market Internship, Career Design Workshop, and so on. 81 members have registered to the system in two years.

Enterprise Week

Enterprise Week is made up of a lecture and exhibition conducted by a company engineer. The practical and progressing R&D stories, they are occasionally success stories, are lectured and the commercial products which are practically dealt in various markets are exhibited just in front of students as the results of R&D activities in the company, as



(a) (b) (c)

Fig. 5. Enterprise Week (a) a poster, (b) the lecture, and (c) the exhibition

shown in Fig. 5. It is found that the education programs showing the practical instances are valuable to students by knowing the fact that 96 % of the participants replied that the programs were effective to them in their reports after the course, as shown in Fig. 6.

Technology Ethics Lectures

Social and environmental problems occur with the change of modern society. The lectures are presented because it is important to educate engineers and technicians on technology and enterprise ethics.

Fig. 6. Reputation of Enterprise Week after the questionnaire of students

Conclusions

A novel career education program containing a couple of internships with different aspects has been conducted to motivate the students as a vocational education. Market Internship and following Career Design Workshop was performed with attendance of the members of Network of 100 Wisdom. As a result of the above practical career education, we have established a program that nurtures talented people who can adopt themselves to society with their own initiative and high ethics. They can then act as their aptitudes direct them. This education will help students to select the right careers.

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