ATTITUDE AND ROLE OF INSTRUCTORS IN MANUFACTURING ACTIVITIES WITH STUDENTS

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Abstract: Utsunomiya University Faculty of Engineering has developed education programs focused on innovation for undergraduate students, and has repeatedly improved them in various ways, with the aim of cultivating an affinity for manufacturing, autonomy, and creativity. Innovation-focused education programs for undergraduates include the cross-disciplinary project-based learning (PBL) subject Innovation Engineering for first year students, designed to motivate students in engineering and to serve as an introduction to specialist courses. Furthermore, Innovation Engineering II and III are also offered, with the aim of improving capabilities that enable the adoption of plan-do-check-act (PDCA) cycles. This report describes the attitude and role of instructors, through the process of leading classes in the subject "Innovation Engineering II," with consideration of the differences in standpoint of companies and universities.

Keywords: Engineering Education, Problem-Based Learning

1. INNOVATION-FOCUSED EDUCATION
1.1 Innovation Engineering I
One of the features of the classes in this subject is that students are divided into cross-disciplinary groups. The students as the groups engage in communication regarding their assigned themes. They work through a process of problem solving. Finally, they each make a presentation. The instructor and teaching assistant for this subject leave students to work autonomously as far as possible, and interfering as little as possible. The students cultivate autonomy, creativity, and originality; they develop communication skills, and presentation skills. These are the aims of the subject.[1]-[5]

1.2 Innovation Engineering II and III
These subjects form part of the innovation-focused education provided by the faculty. By tackling projects requiring specialized expertise, students cultivate management capabilities. The students also pursue their projects autonomously and strive for standardization in their manufacturing activities. The subjects can also be regarded as a means to build on the skills developed in Innovation Engineering I.

2. ACTUAL CLASSES
2.1 Creating illumination installations
Over a number of years, one of the project themes offered in Innovation Engineering II at Utsunomiya University is the creation of illumination installations. In forming cross-disciplinary teams, it is quite difficult to select themes that provide for work in each of the various fields of specialization. The theme of illumination is one that allows for a wide range of technological elements.
2.2. Attitude of instructor

In my experience in the harsh reality of a company environment, with pressures to meet deadlines and make profits, even when there is strong encouragement, there is no time whatsoever for patiently allowing people to learn from mistakes. How was it possible, then, to allow students to learn from mistakes in this illumination creation project? It’s clear that the answer lies in the perception of being in an educational setting. In line with this logic, there have been attempts to set up educational bodies within companies for training recruits and conducting periodic education, as opposed to depending solely on on-the-job training (OJT). The number of such initiatives has been limited, however, and most companies continue to rely on OJT for their education needs. Accordingly, innovation-focused education programs at universities, in which students are free to make mistakes, represent a big opportunity for nurturing creativity. I regard this as a mission and plan to continue making efforts in this direction.

3. ANOTHER ROLE PLAYED BY INNOVATION-FOCUSED EDUCATION

In much of the field of manufacturing today, the creators and users of products have no interaction with each other. This means the ideas and skills of creators are not directly evaluated by users. Company activities are result-oriented, and more weight is given to costs than anything else. In some cases, this becomes excessive, resulting in the shipment of defective products. The creations of the students are seen and appreciated by many people at the contest venue. The essence of education lies exclusively in the relationship between instructor and students, but students mentioned that the contest allowed them for the first time to experience the relationship between creator and user and to have their work directly assessed by users.

4. CONCLUSION

Typically, instructors in university education are specialists in the fields they teach, while students simply receive guidance from them. In manufacturing education, however, there are many challenges that lie outside both the instructor’s field of specialization, and also that of the students. My next challenge is to investigate the differences in educational effectiveness of combinations of the specialist and non-specialist disciplines of instructors and students, through classroom assessment questionnaires after learning, and follow-up questionnaires after graduation.

REFERENCES