International Collaborative Project in Engineering Design Education between Kanazawa Institute of Technology and Singapore Polytechnic

This paper reports positive learning outcomes in the international collaborative project in Engineering Design Education between Kanazawa Institute of Technology (KIT) in Japan and Singapore Polytechnic (SP) in Singapore.

In 1996, KIT became the first university in Japan to offer courses in Engineering Design. The courses were developed with the assistance of visiting professors from U.S. universities. While the program began with the assistance of foreign faculty, it was never intended to model it after a design program in any country. The courses were to serve the needs of Japanese students as well as Japanese industry. The goals of the courses were to have students not only gain actual engineering design experience through working on real-life projects, but also acquire skills in presenting their results in written and oral reports.

At present, all Engineering Design classes are taught by Japanese professors. The KIT program has become a real Japanese design program. Foreign institutions are now sending representatives to KIT to study our program. For example, two visiting professors from SP stayed at KIT from November, 2002 to February, 2003 to study the Engineering Design courses. SP has implemented an Innovation, Design & Enterprise in Action (IDEA) module. As a result, an international collaborative program has started between KIT and SP.

In 2003, eight teams at KIT and one team at SP worked on an engineering design project, the theme of which was “Roof Top Gardens”. The main goal was to create roof top gardens where people can relax and enjoy themselves. Nine teams independently worked on different gardens focusing on their themes of interests.

Their achievements were unique in their design solutions due to the differences in climate and culture in Japan and Singapore, although all the design teams followed the same engineering design procedure;

1. identifying project/design opportunities,
2. characterizing design projects,
3. generating design concepts,
4. evaluating design concepts and to select the best concept,
5. designing in detail, and
6. presenting results.

For example, one team of KIT designed a recycling system which utilizes rainwater for trees and lawn in the roof top garden. In order to confirm the effectiveness of the design solution, they carried out an experiment and found that approximately 40% of rainwater could be recovered and utilized for watering the garden. The SP team created a video movie by which visitors can virtually take a walk in the roof top garden. The SP team concluded that the roof top garden reduces the surface temperature of the roof by 15 to 20 degrees Celsius and lower the ambient temperature by 1 to 3 degrees Celsius.

This collaborative project was a positive experience for both students and faculty members. Furthermore, both groups benefited from a study of the design solutions generated by their foreign counterparts.