Sustainable Global Engineering Education Program with the USA and China

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Abstract:
A number of professors from a Midwestern engineering university have teamed up with the technical university in China to provide a global aspect to engineering education. The American university offers four different undergraduate certificates for students in automotive engineering and electrical engineering in Shanghai. The program has been operating for ten years, and a number of sustainability issues are ongoing, and the results are presented in this paper.

Summary:
A Midwestern technological university [Lawrence Technological University, LTU, in Southfield MI http://www.ltu.edu] has teamed with a Chinese technological university [SUES] to teach specific technological courses in English only. Shanghai University of Engineering Science [SUES] is a strong regional engineering college in Shanghai China and it focuses on undergraduate engineering in China. Lawrence Tech [LTU] is also a strong regional engineering college and LTU is in Southfield, Michigan. The present focus of the program is to exchange students, introduce the Chinese students to the various teaching methodologies as presented by the various engineering professors, encourage further higher education among both LTU and SUES students, and to make inroads in research in both universities. Many of the professors who accept this visiting professorship in China are adjunct faculty who has recently left the automobile industry, and many have taught engineering courses in Southfield, MI at LTU. This is viewed, in general, as a distinct advantage as it is hoped [and believed] that the recently obtained manufacturing and automotive knowledge gained by these adjunct faculty will provide a vehicle for the transfer of the latest engineering technology to the Chinese. This results in approximately 15 faculty comprising the cohort of the English spoken only program, and approximately 800 engineering students per year.
Evolving Points:

1. Recruit different majors
2. Tailor different certificates
3. Recruit and facilitate different adjuncts and full time professors
4. Enhance professor training, both American and Chinese
5. Assessment of program, and changes for improvement

TABLE 1: SUES/LTU Engineering Quality Control student growth

ENGINEERING SPECIFIC COURSES

The specific courses in the program include Introduction to Engineering, Introduction to Electrical ND Computer Engineering, Engineering Quality Control, Automotive Microcontrollers, Automotive Electronics, Automotive Principles, VLSI design, Project Management, Engineering Cost Analysis, Electrical Machines, Engineering Materials, Project Management, and Control systems. The LTU courses are different in substantial ways from the SUES courses. For instance, the LTU courses
have a computer aspect to them, including Matlab and Excel. The Controls class exams require Matlab programming clips, which is unique.

Furthermore, the Engineering Quality Control and Computer Networking classes require a project and presentation. The topic is a company that has won a Malcolm Baldridge National Quality Award, or any other national quality award. The students have a rubric for the presentation. The rubric is: company choice, award choice, award criteria, year criteria, and improvement. Each year, the students discover various quality aspects, enhancing their learning and awareness of industry in a wide variety of countries.

TABLE 2:

http://www.nist.gov/baldrige/community/upload/National_Quality_Business_Excellence_Awards_in_Different_Countries.xls

The Computer Networking project at SUES has been evolving each year, and the topics relate to their other coursework. For example, the students choose to research and investigate topics in microcontrollers or electronics, and the professors coordinate the veracious topics to ensure that selections are unique. For both classes, the Chinese students now work in a structured group: a leader, a researcher, a presenter and a designer. A structured approach to the assignment and a well-explained rubric help to make the project and presentation successful.
CONCLUSION:

The SUES/LTU collaborative undergraduate engineering program will continue to concentrate on improving aspects of the program, especially involving student attitudes and improvement. Rubric development and course assessment for improvement will be enhanced. In conclusion, we both find this collaborative program dynamic, exciting, evolving, and further assessment in the area of pedagogy and program accreditation [i.e. ABET] will be investigated.

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REFERENCES

