

PREPARING ENGINEERING STUDENTS FOR THE GLOBAL SOURCING ENVIRONMENT

Faculty Paper
Glogalization

Louis Manzione and Akram Abu-aisheh
College of Engineering, Technology, and Architecture
University of Hartford
manzione@hartford.edu

Abstract

Rapid changes in modern product development and realization and the move towards globalization are creating gaps in the engineering education systems around the world. The global economy has changed the way that engineering firms design, develop, and produce their products, and the new global business realities mandate that all firms should evaluate many design, development, and realization options available worldwide, not just locally. The current changes will only increase as the world economy becomes more competitive, interdependent, and accelerated by broadband networks that facilitate highly interconnected global relations to better prepare engineering students for the emerging global sourcing environment. This paper presents a plan for preparing engineering students for the new global sourcing environments.

Introduction

In the continuously changing world towards more globalization, there is a clear need for collaborative and dynamic university-industry partnerships. In order to prepare engineering students for the global sourcing environment, engineering colleges will need to create large and more complex partnerships, and the engineering community will need to have these partnerships to be anchored in the engineering colleges so that the technical solution will remain central to competitive success in the marketplace. This will result in the development of the pipeline of engineers with skills in supply chain management, technology evaluation, and quality engineering and testing. These engineers will become employees who know how to operate in their world of multiple simultaneous product lines with extensive customer interface.

Engineering education in the global sourcing environment should prepare engineers to master preparing specifications and sources sought documents, conducting technical evaluations on the multitude of solutions available to them, assessing capabilities of suppliers and partners, developing testing plans, and operating in different nations and with different cultures. This preparation should give students the opportunity to master working in the real life supply chain management. In this paper, we present a strategic plan for preparing engineering students for the new global sourcing environment. This plan is based on the adoption and implementation of four strategies; university-industry partnership, problem-based learning, course portfolio, and study abroad.

Engineering education in the global sourcing environment should prepare engineers to master preparing specifications and sources sought documents, conducting technical evaluations on the multitude of solutions available to them, assessing capabilities of suppliers and partners, developing testing plans, and operating in different nations and with different cultures. This paper presents a strategic plan for preparing engineering students for the new global sourcing environment

A variety of work has been published on the need for globalization and its impact on the manufacturing section of the economy from different aspects. From the technical point of view, facility location and capacity planning within a single company's multi-period global supply chain model incorporating global bills of materials, duties, and local content requirements was developed [1].

Engineering education today is undergoing unprecedented array of challenges. Among other challenges in this area universities heed to prepare their engineering students for a new era of globalization. To address some of these challenges, the authors are presenting a plan for universities to prepare their students for the new global sourcing environment.

The Global Sourcing Environment

The global sourcing environment is an environment in which engineers regularly prepare specifications and sources sought documents, communicate specifications to potential partners and suppliers, conduct technical evaluations on the multitude of solutions available to them, assess capabilities of suppliers and partners, develop testing plans, and operate in different nations and cultures.

The global economy has changed the way that engineering firms design, develop, and produce their products. This has required changes in the supply chain management for high-tech production lines [2-4]. Broadband networks, cost effective global delivery services, and global business realities mandate that all firms evaluate many design, development, and realization options available worldwide. These realities have created a global sourcing environment which will only increase as the world economies become

more interrelated and more competitive, interdependent, and accelerated by broadband networks that facilitate global relationships.

In order to foster a global perspective, the goals of an international experience represented in a study abroad program should go beyond one country. To obtain an understanding of the emerging global environment, it is important to develop an understanding of the world and the challenges faced by different regions, and the forces that hold them in balance. It is clear from recent events that in this post-Cold-War era civilization is likely to play a larger role in this dynamic than governments and national boundaries. Study abroad programs that provide students with opportunities to develop a systems-level understanding of globalization.

Strategic plan for preparing students for the global sourcing environment

The following sections in this paper discuss each strategy and how it can contribute to the strategic plan for preparing engineering students for the global sourcing environment. This strategic plan was developed to fill a gap in the current engineering education systems. This gap was created by the following factors in the current engineering education system:

1. Under-emphasis on translating technical challenges to RFPs and Specifications.
2. Little or no emphasis on technical evaluation of offered solutions.
3. Little emphasis on business case vs. technical specification trade-offs.
4. Under-emphasis on systems engineering and industrial engineering.
5. Significant lack of Quality Engineering and Product Testing Statistics.
6. Continued under-emphasis on DFM.
7. Significant under-emphasis on sustainable engineering solutions, and environmental impact of product and processes to produce it.

The plan presented in this paper to prepare students for the global sourcing environment is based on the adoption and implementation of the following four strategies:

1. University-industry partnership
2. Problem-based learning
3. Course portfolio
4. Study abroad

1- University-Industry Partnership

In order to prepare students for the global sourcing environment, it is important to build a university-industry partnership. In this partnership, engineering colleges will need to create collaboration plans to better prepare their students for the 21st century economy, and the engineering community will want these partnerships to be anchored in the engineering colleges so that the technical solution will remain central to competitive success in the marketplace.

2- Problem-Based Learning

In order to prepare students for the global sourcing environment, it is important to incorporate Problem-Based Learning (PBL) as part of the teaching of technical courses. There are many benefits of using PBL including the development of critical thinking, improving students' analytical abilities, and helping students understand the practical applications of the material presented in class.

The traditional method of teaching engineering students follows a plan that is based on the following steps:

1. Begin with a product or design challenge.
2. Explore possible technical approaches
3. Select one or more for a design project
4. Produce prototypes and test the design
5. Develop a manufacturing solution

Universities that adopt PBL move engineering education toward problem-based learning around real world challenges that are every bit as technical, but also capture the many facets of a successful project or product in the 21st Century Global economy.

3- Course Portfolio

A course portfolio is a summary of each chapter in the course. The benefits of student course portfolio includes improving students technical writing that is an essential element in preparing students for the global sourcing environment. Also, a course portfolio allows instructors to evaluate students understanding of course material. A proper implementation of course portfolio can be achieved by letting students know that the course portfolio is the only material they can use in the exam. A chapter portfolio should be limited in length to make sure students can differentiate between important topics and the ones that are not.

Technology has engendered many successful advances in engineering education, and higher education in general, but also has created urgency for new interdisciplinary plan for preparing students to be good technical writers. A course portfolio can help in preparing students to be better technical writers. Having excellent technical writers in the work place will allow for seamless collaborations since significant source of interdisciplinary knowledge can't be communicated without strong technical writing..

4- Study abroad

There have been several studies [5-7] that predicted the global forces that are changing the role of future engineers and focused on the importance of globalization. Study abroad can help engineers think globally. This is important since there are emerging global technological challenges like climate change and sustainable energy sources that are important from a global perspective. Study abroad has many important advantages that

include gaining insight into the global market share and economic trends in use of resources of different regions, understanding the factors that control the establishment of successful technological ventures in other cultures and understanding different cultures.

Conclusion

We presented a strategic plan intended for preparing engineering students for the global sourcing environment. This plan is based on the implantation of university-industry partnership, problem-based learning, course portfolio, and study abroad strategies.

In order to prepare engineering students for the global sourcing environment, engineering colleges will need to create large and more complex partnerships, and the engineering community will need to have these partnerships to be anchored in the engineering colleges so that the technical solution will remain central to competitive success in the marketplace. This will result in the development of the pipeline of engineers with skills in supply chain management, technology evaluation, business management, and quality engineering and testing. These engineers will become employees who know how to operate in their world of multiple product lines with extensive customer interface.

References

- [1] J. Goentzel, L. Manzione, R. Piberink, J. Pruett, and B. Thiessen. "Strategic Development of Specialized Testing and Remanufacturing in a Global High Tech Supply Chain." *International Journal of Manufacturing Technology and Management*, 11(1) P28, 2007.
- [2] Arntzen, B., Brown, G., Harrison, T., and Trafton, L. (1995), "Global supply chain management at Digital Equipment Corporation," *Interfaces*, Vol.25, No.1, pp. 69-93.
- [3] Beamon, B. and Fernandes, C. (2004), "Supply-chain network configuration for product recovery," *Production Planning and Control*, Vol.15, No.3, pp. 270-281.
- [4] Cohen, M. and Huchzermeier, A. (1998), "Global Supply Chain Management: A Survey of Research and Applications," in Tayur, S., Ganeshan, R., and Magazine, M. (Eds.), *Quantitative Models for Supply Chain Management*, Kluwer Academic Publishers, Boston, pp. 670-702.
- [5] Friedman, T., The World is Flat: A Brief History of the Twenty-first Century, Farrar, Straus, and Giroux, 2005.
- [6] The Engineer of 2020: Visions of Engineering in the New Century, National Academy Press, 2004.
- [7] Innovate America: Thriving in a World of Challenge and Change, Council on Competitiveness, 2005.