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BEST PRACTICES IN ENGINEERING EDUCATION: CAN DIGITAL IMMIGRANTS TEACH DIGITAL NATIVES?

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ABSTRACT

Engineering education continues to experience dramatic changes. It has become more globalized, learner-centered rather than education-centered with the focus being the learning outcomes and their relevance to the stake holders and the wellbeing of society. In particular, most developed degree programs cover discipline and contextual knowledge, practice knowledge and skills as well as professional attributes.

Of major importance to the development of a highly innovative engineering degree program is a correspondingly highly innovative engineering curricula. The curricula should be based on the use of open-ended problems, project-based learning, and group design projects to inspire the students and encourage them to adopt lateral thinking in dealing with real world open-ended group projects. This will help them develop the much needed communication, time organization and conflict resolution skills, cost management, divergent thinking and the symbiotic learning of fundamentals of engineering sciences which are mostly taught in isolation, as depicted in Figs. 1 and 2.

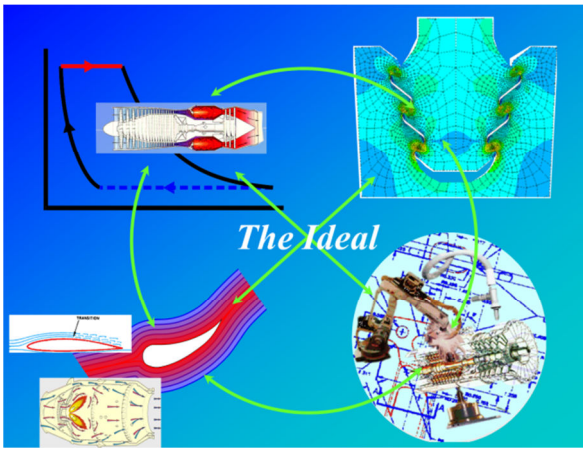

Fig. 1 - Integrated engineering curricula

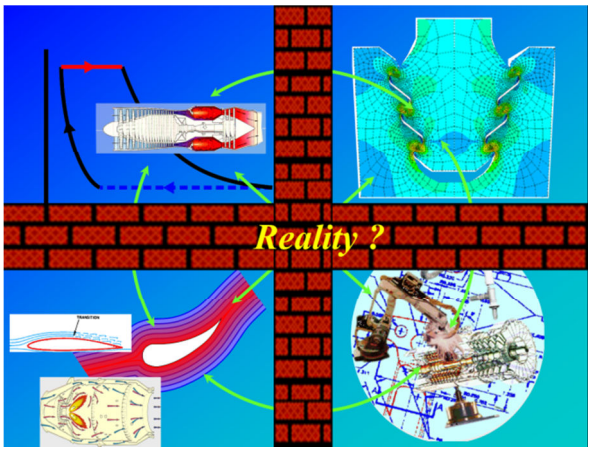

Fig. 2 - Compartmentalized engineering curricula

Many reports on engineering education have identified the vast diversity of professional pathways. An innovative educational response should be to encourage the development of students' self-identity through the notion of being a "student engineer" as opposed to "engineering student". Finance, business, innovation and entrepreneurial skills as well as leadership training are new facets of our engineering education and need be addressed in our curricula. It is not uncommon for an engineering graduate to become a banker, a lawyer or a medical doctor. This must be considered in the design of engineering curricula.

We must move away from the traditional and highly structured teaching methodologies that stifle students' imagination and adopt case-based teaching to harness the benefits of the new information technology. Our approach must pivot around our ability as educators to motivate and engage our students and encourage them to think outside the box in a highly interactive and meaningful manner. It is not merely replacing *`chalk`* with *`chips`* that is characterized by information dumping and memory-based learning. It is the way forward for best practices in engineering education.

We now turn to another important issue that concern us as educators. We must realize that our new learners are digital natives, while us, the educators, are digital immigrants. They are all "native speakers" of the digital language of computers, cell phones, video games, and the internet. They are capable of parallel-processing and multi-tasking and they function best when networked. Digital immigrants, on the other hand, have very little appreciation of these new skills, which the natives have acquired and perfected through many years of interaction and practice. In this presentation, Professor Meguid will formulate many thought-provoking questions about the issues raised in this abstract.

Keywords: Engineering Education, Engineering Curricula, Lateral Thinking, Higher Education,

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