The Unique Experience of Being Educated in VCU's New Nuclear Engineering Program

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INTRODUCTION

Due to the prospect of a dramatic increase in the demand for nuclear professionals, a number of universities are either strengthening their existing nuclear engineering programs or starting it for the first time. Following this trend, Virginia Commonwealth University, in Richmond, Virginia, in 2009 began to offer a concentration in Nuclear Engineering within the Department of Mechanical Engineering. As a student within the program, Hector Medina, in the PhD program, presents its unique perspective, as well as a recollection from some of the undergraduate students.

The author has been driven to both learn the process that has sustained this program, and research about how to continue making it sustainable if present limitations were to continue. Author believes that the present paper will provide positive feedback to faculty members and motivate students in any new program and, particularly, in the nuclear engineering field within this renaissance of nuclear engineering education.

DESCRIPTION OF THE ACTUAL WORK

Students joining the burgeoning nuclear education departments are confronted with unique pedagogical challenges. But, the author has believes that:

"*Any complex challenge has N finite number of fundamental steps that explain it. Knowing what those steps are is the duty of an effective and responsible educator. On the other hand, an apt pupil is expected to understand what those fundamental steps mean*".

Working with limited instrumentation and a newly developed curriculum, both students and faculty must be inherently self motivated and creative in order for them to achieve the standards of education expected by prospective employers, as well as regulatory institutions. This prerequisite for involvement creates an environment of particular innovation. This paper explores the innovations and the creativity in research and interdisciplinary that has flourished within the MNE department at VCU, from a student's perspective. Evidence is provided both through relevant anecdotal means and research from within journals dealing with pedagogical matters.

Spontaneous Innovation

One common concern among university programs is attrition and the small nature of new engineering programs creates a smaller student teacher ratio than other larger, more established programs. Students get a significant amount of instructor interaction outside of the classroom. This personalization of the academic experience should contribute to a decrease the amount of students leaving the major [3]. According to our experience, new programs are afforded a significant level of flexibility because courses are being taught for the first time and student input is highly regarded, not necessarily in terms of the context but in terms of the form, quantity and variety. The program will naturally tailor the syllabi and course expectations around the pilot classes concerns and trials.

A similar trend occurs in research areas, as well. While the scarcity of instrumentation and historically established funding structures can create obstacles for students doing research, these same students are benefited by a forced level of creativity.

Open Innovation and Networking

Interdisciplinary collaboration will become a major component of these research projects. The *Materials Genome Initiative for Global Competitiveness,* for instance, is a recent proof of this being a concern, at all levels. This paper will discuss ways of applying *OI 2.0* and *OI 3.0* in the teacher-student and student-industry directions. An important aspect, as well, is the introduction of department-to-department networking. In our experience, we have encountered that there are more resources (e.g. experts, instruments, special devices) within a particular university, and that these are not taken advantage of due to several reasons including lack of communication, isolation, fear of approaching, etc.

Creativity

This paper will present a number of areas within nuclear engineering in which research can take place

despite limitations. Knowledge can be introduced into many other fields and each junction opens up a spectrum of new research areas. For example, when nuclear energy technology is integrated with politics, then new research areas like regulation, proliferation, and nuclear diplomacy arise.

RESULTS

Most research focuses on a more general account and recommendations for engineering disciplines not specific to nuclear engineering. The authors will connect this generalized research to the nuclear engineering discipline in a way that connects the current nuclear renaissance to pedagogical challenges of new university programs in the subject area.

The final paper will show that spontaneous innovation and creativity are and will continue to be key processes for the survival of the new nuclear program at Virginia Commonwealth University, and that these basic facts can be extrapolated to almost any other university with a similar program.

NOMENCLATURE

OI 2.0 = Open Innovation version 2.0
OI 3.0= Open Innovation version 3.0

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