

ABSTRACT: 2013 ELATE Institutional Action Project Poster Symposium

Project Title: Design and Implementation of a Certificate Program for “Teaching Engineering in Higher Education” within the Villanova Engineering Ph.D. program

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Collaborator: William Kelly, Villanova University

Background, Challenge or Opportunity: The Villanova University College of Engineering (CoE) is widely recognized as a top school for undergraduate engineering education, consistently ranking within the top 10 nationally for undergraduate focused engineering programs. The college introduced an interdisciplinary Ph.D. in Engineering program approximately 10 years ago, and the program has steadily grown in both enrollment and prestige, currently enrolling more than 40 students in a variety of disciplines. Many of these students aspire to faculty positions. The challenge of this project is to leverage Villanova CoE’s acknowledged excellence in undergraduate instruction into a certificate program in which our Ph.D. students learn and practice state of the art pedagogical methods and develop skills which start them along the path towards teaching excellence. This will reflect well on Villanova as our graduates then enter the academic workforce prepared to excel in both teaching and research.

Purpose/Objectives: This project focuses on the design and implementation of a two-course certificate program for CoE Ph.D. students in “Teaching Engineering in Higher Education” with the intent of preparing our doctoral students who intend to pursue academic careers to excel in both teaching and research.

Methods/Approach: The certificate program will consist of two courses. During the first course the students will learn basic higher education pedagogy, learning theories and active learning strategies for a variety of classroom settings. Students will learn how to handle in class discussions, teamwork, course design, assessment strategies, effective technology use and pedagogical methods specific to engineering. These concepts will be practiced during class time in groups of small students. The second course will be a Teaching Practicum which combines both classroom instruction for the students and a formal teaching mentorship in which each student is individually paired with one of the college’s “Master Teachers.” This professor serves as the student’s mentor and the student works as the professor’s TA. The mentor and student will have weekly meetings to review the course progress and instructional methods. Late in the semester, the student will be allowed to teach the course several times under supervision from the mentor. One of these sessions must include the collection and evaluation of student feedback and one session must include the videotaping of the student for review with an advisor. Upon successful completion of both courses the students will receive the certificate which will be officially noted on their transcript.

Outcomes and Evaluation: This project will be considered successful if the certificate program is implemented and executed, and if a sustainability plan for the continued offering of the program is developed and implemented.

Design and Implementation of a Certificate Program for “Teaching Engineering in Higher Education” within the Villanova Engineering Ph.D. program

Amy S. Fleischer, Professor of Mechanical Engineering

Background Challenge & Opportunity

The Villanova University College of Engineering (CoE) is widely recognized as a top undergraduate focused engineering program, consistently ranking within the top 10 nationally. The college introduced an interdisciplinary Ph.D. in Engineering program approximately 10 years ago, and the program has steadily grown in both enrollment and prestige, currently enrolling more than 40 students in a variety of disciplines. Many of these students aspire to faculty positions. The challenge of this project is to leverage our acknowledged excellence in undergraduate instruction into a program in which our Ph.D. students learn and practice state of the art pedagogical methods and develop skills which start them along the path towards teaching excellence. This will reflect well on Villanova as our graduates then enter the academic workforce prepared to excel in teaching and research.

Purpose and Objectives

This project focuses on the design and implementation of a two-course certificate program for CoE Ph.D. students in “Teaching Engineering in Higher Education.” The mission of the program is to introduce contemporary theories of effective engineering education to our Ph.D. students, allowing them to learn and practice state-of-the-art pedagogical methods with faculty mentorship.

Villanova Course Catalog

EGR 9200 Teaching Engr'ng in Higher Edu

This course, for Ph.D. students, introduces contemporary theories of education at the collegiate level, and demonstrates effective methods of engineering instruction. Students will develop teaching skills that promote active learning in the college classroom. 1.00credit(s)

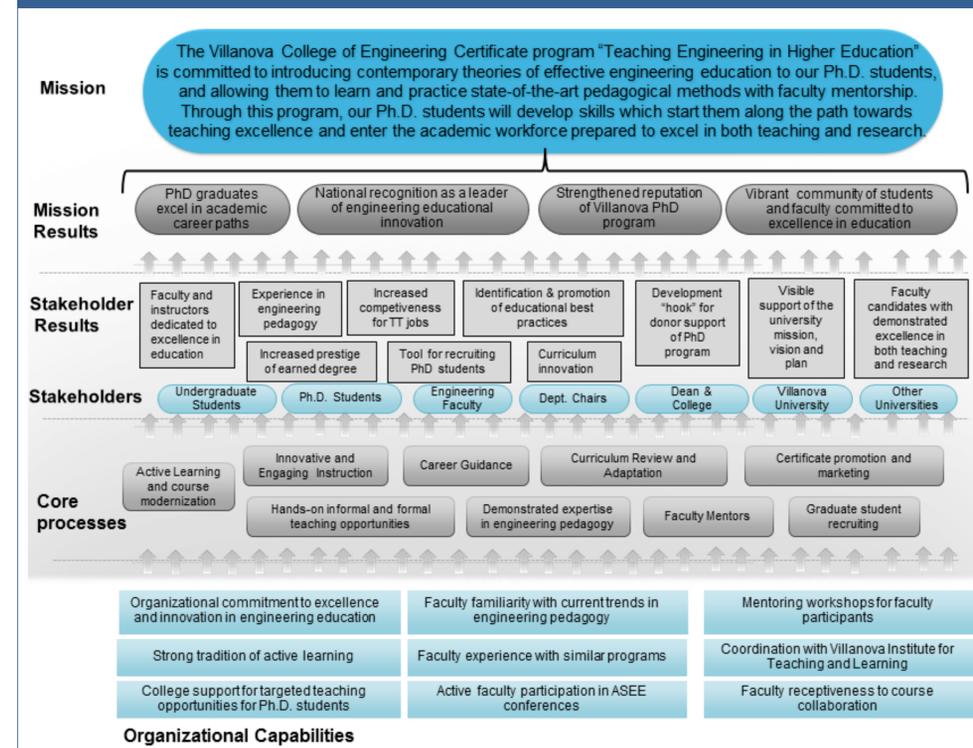
EGR 9220 Teaching Engr'ng Practicum

This hands-on immersion style course provides an opportunity for students to practice the methods learned in EGR 9200 in a supervised environment. Students will work directly with a faculty mentor in a classroom environment observing and participating in effective engineering teaching methods. Students will also have a course classroom environment in which they will prepare for the academic job search process. 1.00credit(s)

Outcomes and Evaluation

This IAP will be successful if the certificate program is implemented and executed, and if a sustainability plan for the continued offering of the program is developed. The program will be considered successful in the long term if it is considered by our graduates to be a positive influence the launch of their academic careers.

Strategy Map



Methods/Approach

I worked in partnership with a fellow faculty member on the development and implementation of this certificate program. My colleague and I identified the major stakeholders of the project and worked with each of them to develop a program that meets the needs of a diverse engineering community while still creating a program that is true to our pedagogical vision. We worked with the College of Engineering Dean, the two Associate Deans, the college PhD committee and the individual department chairs, all of whom had slightly different goals for the program. While all stakeholders approved of the concept in theory, it was still difficult to get this program officially approved and integrated into the degree program. The major challenge that needed to be overcome was the integration of the program into the overall PhD coursework and plan of study. There were concerns about credit count of the courses, about credit payment from grants and fellowships, about the overall role of the certificate in our degree program and in the student’s plan of study, and the effect on research productivity. Additionally, I had concerns about the program’s sustainability. Ultimately we worked through these challenges and the courses are now approved and are in preparation for their first offering during the 2013-2014 academic year. The paperwork for the approval of the certificate is in preparation. I will be the primary instructor for the 2013-2014 AY, and my collaborator will offer the course in 2015-2016

Program Curriculum and Topics

- Stages of development. Theories of learning
- Setting a classroom environment for effective learning.
- Implementing active learning in the classroom
- How to effectively use lecturing in the classroom
- Advantages of team work in a classroom setting.
- Common pitfalls of teamwork, strategies for functional teams.
- Technology in the classroom.
- How to foster creativity and imagination.
- Managing classroom dynamics
- Constructing a syllabus, course outline and learning goals.
- Assessing student learning.
- Collecting and using student feedback
- Learning outside the classroom
- Student mental health concerns and the effect in classroom
- Types of higher education institutions and faculty positions
- What is tenure and how do I get it?
- Faculty job search process and the job search portfolio
- Preparing your vita, teaching and research philosophy.
- The faculty interview. What to expect and how to prepare..
- The first year as a faculty member.
- Working with a faculty mentor, supervised teaching experience.
- Video tape of teaching and feedback.