



# Multiple Approaches to Preparing Graduate Students for Non-academic Careers at Two Universities

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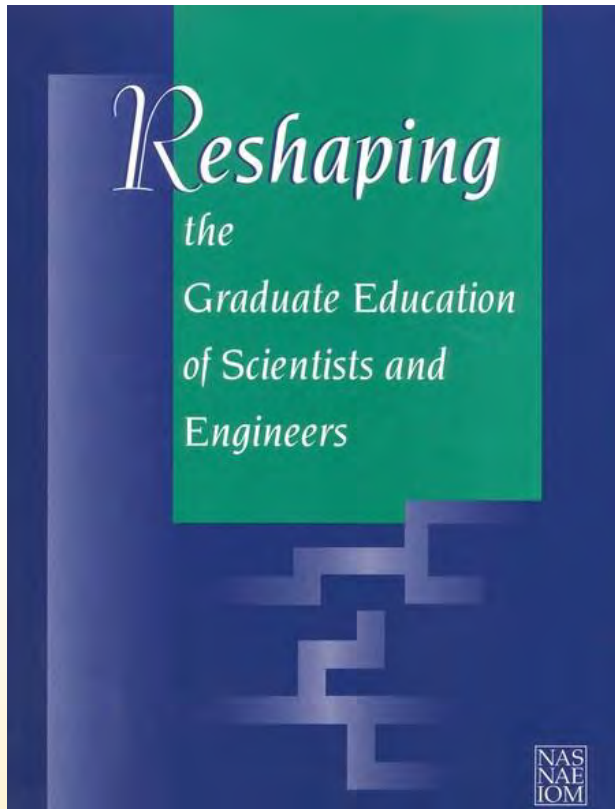
Boone, North Carolina

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# Recognizing the Need to Prepare our Students for Non-Academic Positions

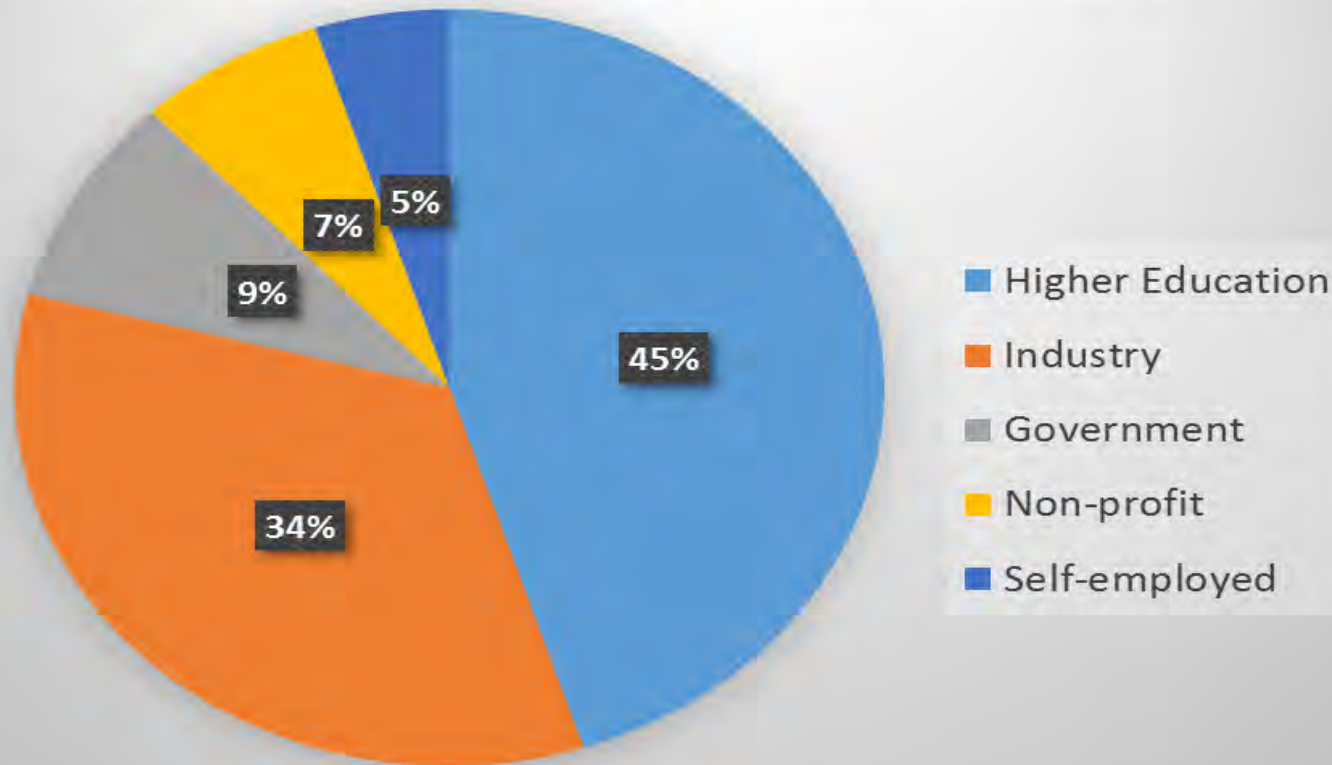


My first recognition of the need for “alternative” professional development occurred in the 1980’s when over a third of our Cell Biology doctoral graduates entered non-academic positions.

*Reshaping the Graduate Education of Scientists and Engineers (1995)* by the Committee on Science, Engineering, and Public Policy (COSEPUP), National Academy of Sciences, Washington DC was one of the first reports to document and promote the need for this training.

# High Percentage of STEM Doctoral Graduates Entering Non-academic Positions

Source: NSF, Science and Engineering Indicators, 2014



# Major Challenges to Promoting Professional Development for Non-academic Positions



**PROFESSIONAL DEVELOPMENT**  
Shaping Effective Programs  
for STEM Graduate Students



- ❖ Limited Resources
- ❖ Selecting the Content for the Development Program
- ❖ Acquiring Faculty Buy-in
- ❖ Lack of Student Interest/ Participation

NOTE: Surveys indicated that 56% of 857 graduate school respondents had professional development opportunities at both the centralized Graduate School level and the college or degree program level with similar challenges at both levels.

Denecke, D., Feaster, K., & Stone, K. (2017). Council of Graduate Schools, Washington, DC

# Profiles of the University of Central Florida and Appalachian State University



Urban/ suburban setting in Orlando, FL

Enrollment (2014): 60,821 (8526 Graduate).

31 Doctoral; 82 Master's Programs.

Approx 40% of doctoral physics, life, and math sciences graduates entered non-academic positions; Approx 70% of doctoral engineer graduates entered non-academic positions.

Was traditionally STEM but is rapidly evolving into broader disciplinary areas.



Rural/ mountain setting in Boone, N.C.

Enrollment: 18,026 ( 1,771 Graduate).

1 Doctoral; 39 Master's Programs.

Approx 85% of Masters' graduates entered non-academic positions.

Heavy emphasis on "sustainability" in most degree programs.

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# Graduate School Coordinated Development Programs: UCF



University of Central Florida

Not typically “Immersive, hands-on” experiences.

Over 150 seminars/ workshops per year on 50+ topics.

Both professional and personal development topics.

Using “Certificates” to be awarded to students completing a series of workshops (e.g. *Grantsmanship*).

Some workshops are required of students by their programs (e.g. RCR & Ethics).

Developing more asynchronous “On-line” workshops.

Example of workshops relevant to non-academic careers: Ethics & Personal integrity, Changing careers, Resume’s vs CVs, Advanced interviewing, Professional portfolios, networking, Intellectual property, Conflicts of interests, etc.

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# Graduate School Coordinated Development Programs: Appalachian State U

Not typically “Immersive, hands-on” experiences

Partner with a variety of student support units to offer workshops appropriate for graduate students.

Partners with Graduate Student Association Senate (GSAS) in planning & co-sponsoring some events.

In 2016-17 over 70 seminars/ workshops offered last year with more than 2000 graduate student participants.

Great variety of offerings including Etiquette dinners, Interviewing skills, Personal finances, Specialized course: *GRAD 5530 From Graduate School to the Workplace: The Impact of Immigration.*



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# Graduate School Coordinated Programs: Challenges & Responses



Locating a place to hold seminars & workshops

Created a Graduate Student Center.

Major issue especially in scheduling late afternoon sessions.

Staffing

Hired a program coordinator.

Hired a Director of Student Services & Development.

Faculty to offer workshops

Give financial incentives (Travel/ research awards).

Not currently an issue.

Student participation

Socialization. Personal improvement. Award Certificates. RCR Required.

Personal improvement. Socialization. Partner w GSAS.

Faculty buy-in

Hold many sessions in late afternoon & evening

Not currently an issue  
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# Doctoral Degree Programs: Examples of Immersive Development Approaches

- ❖ Modelling & Simulation: Interdisciplinary program; Competencies developed from input of industry and government M&S professionals. Applied research allowed. Curriculum allows for Internships as electives.
- ❖ Industrial Engineering: Can complete *Applied Operations Research Graduate Certificate* as electives.
- ❖ *Engineering Leadership & Innovation Institute (eli2)*: Activities “build professional skills beyond a degree, such as communication, collaboration, presentation skills and global thinking.” Funded by private industry partners. Offers a *Leaders Up Close Seminar Series*. Includes undergraduates and graduate students.
- ❖ *Limbless Solutions* Team: A non-profit interdisciplinary team founded by an engineering doctoral student that provides opportunities for many graduate students to work with alumni in designing and developing low-cost robotic limbs for children.
- ❖ In many programs, variety of seminars by researchers employed in industry.

# Master's Degree Programs: Examples of Immersive Development Approaches



- ❖ MS Modeling & Simulation: **Practicum** for Non-thesis students.
- ❖ MS Nanotechnology: Housed in NanoTechnology Center with **applied research experience**.
- ❖ MS Engineering Physics & MS Technology: **Industry driven curriculum. Applied research projects, Opportunities for interdisciplinary team projects** (e.g. Sustainable home design, Team Sunergy solar-powered vehicle).
- ❖ Professional Engineering Management Track in MS Engineering Management: **Curriculum customized to meet needs of specific corporations.** Eli2 incorporated into the program.
- ❖ MS Biotechnology: **Courses, projects, designed to emphasize an industrial perspective. Private sector guest speakers.**
- ❖ Several programs have **PSM Tracks with internships**, industry advisory boards, **professional development courses**.

# Graduate Degree Programs: Summary of Approaches Used



- ❖ Flexibility in curriculum allows options for students seeking non-academic positions.
- ❖ Competencies within program developed in partnership with private sector professionals.
- ❖ Student research often addresses applied problems.
- ❖ Internships, practicums, etc. offered as electives incorporated into curriculum.
- ❖ Allowing professional development certificates as electives.
- ❖ Leadership Institute activities incorporated into programs.
- ❖ Opportunities for interdisciplinary teams to address specific applied problems in conjunction with alumni and/or outside experts.
- ❖ Non-academic sector speakers in seminar programs.

# Graduate Degree Programs: Challenges to Approaches & Responses

Time demands on Graduate Program Director.

Some programs hire a staff member as a coordinator.

Time demands on students to participate in development activities.

Many development activities incorporated directly into curriculum.  
Some activities offered later in day or evening.

Coordinating and identifying internships & practicums.

Some programs hire an internship coordinator. UCF Graduate School hired an internship coordinator to administer several programs.

Selecting appropriate content.

Some programs have industry advisory boards.

Faculty buy-in and commitment to offer immersive opportunities.

This is MOST important to success of development activities. Some programs convince faculty by using graduate tracking data.



# Thank You For Your Time and Consideration

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