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Doctorates in Occupational Safety and Health: A Critical Shortage

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Despite growth of undergraduate and graduate level course offerings in occupational safety and health, few doctoral degrees (*i.e., either the Ph.D., the Ed.D., or the Sc.D.*) are available for students interested in conducting research and teaching in higher education. The field is at a critical time in its development, first and foremost facing the challenge of providing a compelling education to future college bound students. In addition, the field is under pressure to design a rigorous research driven curriculum to advance scholarship in the field, while preparing and placing young scholars in academic positions. These young scholars need to understand that they must become successful contributors to the advancement of the field and drive the next generation of breakthrough research. The field has reached a critical stage and there is now a significant need for the new and innovative expansion of doctoral programs in occupational safety and health.

During the last 25 years, the field has leveraged its hard won position as a discipline rooted in evidence-based research, providing compelling teaching, and providing unselfish service to private, public and community sectors. This has been chiefly accomplished by emphasizing an applied practice-oriented undergraduate and graduate curriculum. It is now time to construct innovative and creative occupational safety and health doctoral program curricula that carefully develops students' knowledge and skills in theory, research methodology, and teaching; while at the same time equipping students with the competency and capability to advise private, public and community sectors on innovative and creative strategies for confronting and managing existing and future occupational safety and health problems. The emphasis on a research driven doctoral education should not be interpreted to mean that there is any intention to de-emphasize the importance of an applied practice (or applied science) based education. Concern for applied-research and its tie to higher education is still important and its place in higher education remains secure. Constructing a research driven education is not intended to replace applied-practice educational strategies or content. However, a focus only on applied-research should not be expected to move the field along a continuum of development that explores new opportunities and becomes accepted by other disciplines. In addition, the addition to the academy of pure doctoral degrees in safety, health and



environmental would represent several significant contributions to the field. First, doctoral degrees are ear marks of all sovereign disciplines. Second, a clear representation of the intellectual core of the field is often reflected in the curriculum of a doctorate. Third, research performed in doctoral programs is direct responses to the intellectual, practice, methodological challenges of the field. In short, all real disciplines have doctoral degrees specifically focused on basic and applied research questions of the field.

The remainder of this commentary focuses in on a set of recommendations to consider for a doctoral program in occupational safety and health, and suggests a strategy and structure that might be followed to achieve this in major research based institutions.

Recommendations for Doctoral Programs in Occupational Safety and Health

Recommendation #1

Increase the availability of doctoral programs in Occupational Safety and Health at major research based institutions with an emphasis on providing a rigorous theory, research and methodological driven curriculum. The growth of college and university undergraduate and graduate offerings in occupational safety and health has outstripped the supply of doctoral-trained faculty available to deliver offerings and conduct research. The emphasis upon research based universities is grounded in the belief that research driven universities have the necessary infrastructure that is critical for doctoral education legitimacy.

Therefore, we advocate that the occupational safety and health doctoral programs focus on a rigorous multi-disciplinary based education that carefully develops students' knowledge and skills in theory and research methods, as in other disciplines. Of course, as in other disciplines, schools choosing to offer doctoral degrees in occupational safety and health might specialize in particular research areas leading to a unique niche (*e.g., economic-making the business case, policy development, strategic management, etc.*).



Recommendation #2

Focus on the following competencies in theory, research methods, occupational safety and health principles and practices, and professional skills. These competencies are minimum competencies that we believe form the foundation of doctoral training in research based institutions. Students may have additional specialized competencies in their areas of concentration such as finance, economics, policy development, strategic management, legal, etc.

1. Theory and Modeling

- Demonstrate the ability to understand the value of theories and conceptual models in analyzing and developing solutions for occupational safety and health problems.
- Demonstrate the ability to form and apply theories and conceptual models at multiple levels to guide understanding of the social-economic aspects of occupational safety and health.
- Develop expertise in a specialized area of occupational safety and health (i.e., economic, policy, management, etc.).

2. Research Methods

- Demonstrated ability to review and synthesize a body of research literature.
- Demonstrate understanding of principles of research design and statistical analysis as well as the principles of and threats to validity and reliability.
- Demonstrate understanding of the strengths and limitations of quantitative and qualitative methods in research designs and analyses.
- Demonstrate the ability to use a range of data analytic methods and select and apply the most appropriate ones to address specific research questions.
- Demonstrated skills in reasoning and in gathering, synthesizing, and interpreting empirical evidence.



3. Occupational Safety and Health Principles and Practices

- Identify the role of cultural, social, environmental, and behavioral factors in determining the causes and effects of injuries/illness and prevention measures.
- Demonstrate the ability to draw on theory, research, and practice to present compelling justifications for proposed research, programs, and policies.
- Analyze specific occupational safety and health public health problems and issues in terms of their ethical and ideological underpinnings.

4. Professional Skills

- Demonstrate the ability to synthesize and apply scientific knowledge in innovative and creative ways to the development of new conceptual models and/or research questions.
- Acquire professional skills in the production of one's own ideas, including communicating research findings and conclusions in a clear and concise manner in both oral and written forms.
- Demonstrate the ability to write manuscripts of publishable quality for peer-reviewed journals.
- Uphold the highest ethical standards in planning, conducting, and analyzing research.
- Develop skills in collegial exchange, including reviewing the work of others in a constructive manner in group and written contexts.
- Interact sensitively, effectively, and professionally with persons from diverse cultural, socioeconomic, educational, and professional backgrounds, and with persons of all ages and lifestyle orientations.

Recommendation #3

Focus on the following core areas for providing the foundation for doctoral education.

While not all programs will have the resources to offer a full complement in the above mentioned areas, there are opportunities for collaboration across university or school departments (e.g., business, engineering, public health, education, science). Alternatively,



students may pursue independent study to fulfill one or more of these course

requirements in the major areas. We suggest the architecture of a research-based doctoral program in occupational safety and health as follows:

1. Occupational Safety and Health:

- Occupational Safety and Health Management
- Technical Approaches for Controlling Exposures to Hazards
- Economic Analysis of Occupational Safety and Health
- Occupational Safety and Health Law
- Emergency & Disaster Management
- Design for Occupational Safety and Health
- Toxicology and Epidemiology
- Industrial Hygiene and Instrumentation
- Applied Ergonomics and Human Factor Engineering

2. Courses in Methodology and Statistics

- Multiple regression
- Epidemiologic Methods
- Advanced Quantitative Methods
- Research Methods
- Probability, Computing, and Simulation in Statistics
- Environmental Sampling

3. Proposal and grant-writing

4. Research Project

5. Research Manuscript of Publishable Quality

6. Dissertation

It is only through the development of research trained academics that occupational safety and health can achieve acceptance as a substantive and rigorous discipline. The



successful research training and academic placement of occupational safety and health students will drive the next generation of breakthrough research.

Recommendations for Study

- (1) What is the current state of doctoral education in occupational safety and health?
- (2) How should doctoral education in occupational safety and health be designed?
- (3) Are recent doctoral graduates adequately prepared to assume leadership in research and teaching?
- (4) What are the perceptions of recent graduates about their ability to conduct meaningful research and provide compelling teaching?
- (5) Is there currently adequate funding for doctoral students in occupational safety and health? Is the current funding comparable to other similar fields?
- (6) What is the optimal positioning arrangement for occupational safety and health within a university structure (i.e., schools, colleges, departments)?

Conclusions

While safety has survived for generations, both in practice and in academia, we suggest it is time to move the discipline to the next level. Conventional wisdom holds that the age structure of existing safety and health faculty is old. A concerted, systematic effort to generate the next generation of safety and health faculty is upon us. While the current emphasis in safety and health education on practice and compliance is important, it lacks a fundamental capacity to progress the field by structured inquiry into the many challenges that describe the profession. A new generation of faculty trained in a research-based curriculum will have the tools needed to identify the root challenges as well as design effective interventions or solutions to these challenges. In addition, this faculty will have the ability to evaluate the health and financial consequences of both the identified problems as well as the identified solutions.