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# Demystifying the Academic Research Enterprise

## Becoming a Successful Scholar in a Complex and Competitive Environment

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## Introduction

The academic research enterprise. That easily uttered phrase—foundational to our health, prosperity, economic and national security, and quality of life—defines an exceedingly complex and historically vital component of society that is interpreted quite differently by its many stakeholder groups.

To faculty and other professional researchers, it connotes an intellectually stimulating, multi-institutional, multigenerational, multicultural, and rewarding enterprise that underpins their professional lives; supports the creation and dissemination of new knowledge; and educates the next generation of scholars, entrepreneurs, inventors, and technologists. To postdoctoral researchers, it represents the environment within which to develop additional professional skills, independence, knowledge, and relationships that help frame a future of contributions in the academy, industry, or government. To graduate students, it means an educational system that supports study of an interesting topic and preparation of a thesis or dissertation, along with publishing, performing, or exhibiting the outcomes as a step toward pursuing multiple career options. To undergraduate students, it means a broad education underpinned by several courses in their chosen field or fields of study, possible involvement in a mentored research project, and even presenting work at a conference or publishing a paper or two before graduating. And yet to many students—far too many students—it means an opportunity that cannot be seized owing to a variety of socioeconomic, cultural, and/or financial circumstances. Consequently, this limits or even eliminates the ability of such individuals to participate in America's scholarly enterprise and thus become important players in our nation's future.

The view of the academic research enterprise is notably different for those who facilitate research rather than perform it. To senior research officers, such as vice presidents and vice chancellors for research, it means helping faculty and students succeed in creating and disseminating new knowledge, building areas of excellence, and increasing external grant and contract funding to their

institution. It also means engaging with federal agencies to understand future directions of research nationally, including budgets that support research, and influencing those directions via interactions with members of Congress, the executive branch, and other organizations, such as professional societies. To research administrators, the academic research enterprise means an array of rules and regulations, audits, last-minute proposal submissions, and complex negotiations and award management activities including patents and licenses. To private companies, it represents the seed corn of innovation, a major source of intellectual property, and most importantly, the origin of a well-equipped workforce. To funding agencies and private foundations, it represents the repository of talent where investments, usually in response to grant proposals, lead to discoveries, solutions to complex problems, and the next generation of researchers, entrepreneurs, inventors, and technologists. And to the general public, it means a respected, albeit somewhat mysterious element of society that yields outcomes generally viewed as beneficial.

Although these and other groups view the academic research enterprise through vastly different lenses, they share, with the arguable exception of the general public, one important characteristic: *learning about and applying, in practical ways, the many complex elements of this enterprise incrementally, as their career progresses*. Sometimes this learning is provided by a mentor, a workshop, formal certification training, or colleagues. But in most cases, when it comes to researchers, the learning takes place over long periods of time via direct experience, which can lead to unnecessary delays, frustration, false starts, and missteps that sometimes have serious consequences.

As a partial remedy, this book provides a comprehensive examination of key practical topics to enable aspiring as well as early-career researchers (undergraduate students, graduate students, postdoctoral researchers, early career faculty, and research staff) across all disciplines—from art history to zoology—and all types and sizes of institutions, to begin mastering important professional capabilities far earlier in their career than normally would be the case. The content, complementary to knowledge received as part of formal education and training in research, is assembled in a manner that highlights interrelationships among topics, augmented and contextualized with nearly four decades of experience by the author in research and national policy. The chapters need not be read in sequence, and can even be used piecemeal, as stand-alone references. Although the book emphasizes the academic research enterprise, the topics addressed are equally valuable for researchers in the government, corporate, and nonprofit sectors.

Importantly, this book is not a how-to guide or instruction manual for next-generation or current researchers. Rather, it is an educational resource for

developing and understanding researcher roles, responsibilities, and opportunities in the context of the reader's own scholarly program and personal circumstances. As such, this book has been written for individuals at large, comprehensive doctoral research universities and doctoral/professional universities (Carnegie R1, R2, and D/PU classification; <http://carnegieclassifications.acenet.edu>), master's colleges and universities (Carnegie M1 to M3 classification), MSIs, ERIs, and institutions that historically have focused principally on instruction but are becoming more active in research (e.g., PUIs and community colleges). Particular emphasis is given to individuals at the latter institutions, which have relatively limited exposure to the topics contained herein because their institutions often lack the resources and administrative support frameworks to assist their scholarly endeavors.

This book also places scholars in a broad national and international context—not as passive recipients of a system already in place, but as key participants in a system in which their active engagement is essential for helping set priorities, determine policies, drive systemic change, and advance knowledge for the success of the enterprise as a whole.

Chapter 1 sets the stage by addressing foundational issues such as the role of curiosity in research and creative activity; the spectrum of research from fundamental to highly applied and translational; how, where, and by whom research is performed; ways in which outcomes and impacts of research are assessed and valued; and the manner in which academic research administration and services are structured. All research requires funding, and thus chapter 2 is devoted to sources of funding for research, the setting of priorities by research funding organizations, the federal research and development budget process, and strategies for obtaining funding.

Because the bulk of fundamental or curiosity-driven research and creative activity in the US is funded by taxpayers via federal agencies, the general public has a vested interest in research and its outcomes. This topic is addressed in chapter 3, along with factors that shape public understanding, the manner in which belief systems influence public views, and how research results are used in public policy.

Chapters 4–6 focus on the processes associated with proposing and performing research, starting with an array of research methods and extending to finding, creating, and analyzing data as well as research grant proposal development, evaluation, and project management. Subjecting research to scrutiny via the peer review process is addressed in chapter 7, including how to use criticism effectively to advance both individual as well as broader goals. Chapter 8 builds on this topic by discussing bias and multiple points of view in the research enterprise, and chapter 9 addresses the important topic of ethical

conduct in research, the roles and responsibilities of researchers, and consequences that can arise if research misconduct occurs.

Chapter 10 describes the complex universe of research policies and compliance, the roles and responsibilities of researchers, and activities now underway to reduce unnecessary administrative burden, while chapter 11 focuses on approaches for communicating research outcomes to multiple audiences. Chapter 12 delves into the complexities of intellectual property ownership and protection, and ways in which intellectual property can be utilized to advance personal goals as well as the economy, national security, and quality of life.

Many of today's most intellectually stimulating and compelling challenges reside not within a particular discipline, but rather at the boundaries of multiple disciplines. Chapter 13 describes challenges and opportunities of collaboration and working in multidisciplinary teams, as well as the value and structure of academic-corporate partnerships. The book concludes in chapter 14 with a look ahead, including an array of research and education funding and output statistics that place the US in an international context.

A set of questions is provided at the end of each chapter to help assess the reader's comprehension of the material presented, along with several exercises to deepen the reader's understanding via hands-on experience. As noted in the exercises themselves, the amount of time and resources required, and level of guidance needed, vary by topic and activity. A Facilitator Guide also is available online at <https://mitpress.mit.edu/9780262547079> to assist in supervising the comprehension assessment questions and exercises.

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