Demystifying the Academic Research Enterprise

Becoming a Successful Scholar in a Complex and Competitive Environment

By: Kelvin K. Droegemeier

Citation:

Demystifying the Academic Research Enterprise: Becoming a Successful Scholar in a Complex and Competitive Environment
By: Kelvin K. Droegemeier
DOI: 10.7551/mitpress/14740.001.0001
ISBN (electronic): 9780262377201
Publisher: The MIT Press
Published: 2023

The open access edition of this book was made possible by generous funding and support from The MIT Press Frank Urbanowski Memorial Fund

The MIT Press

Notes

Chapter 1

1. Academic tenure essentially is the guarantee of an academic appointment that can be terminated only under exceptional circumstances such as violation of the law, egregious violation of institutional policy, financial exigency, or discontinuation of programs or of the institution itself. Tenure was created to ensure faculty are able to pursue scholarly activities without external pressure. The foundation upon which tenure is built is academic freedom.

2. The sources of internal funding available to the SRO for allocation vary substantially, and in some cases are linked to the recovery of facilities and administrative (F&A) costs from external grants and contracts (section 6.2).

3. Most colleges and universities manage other dimensions of compliance, including those related to athletics, Title IX, auditing, and human resources.

Chapter 2

1. This book attempts to use authoritative figures and graphs based upon the most recent data available. However, in some cases, data collection mechanisms, such as surveys, lead to data sets and associated figures that lag the present by up to a few years. In other cases, figures from authoritative sources are refreshed only periodically. Fortunately, trends of data over time in most of the figures shown in this book do not change appreciably. Relevant exceptions are noted.

2. Although OMB has formal directive authority over federal agencies, OSTP does not, except in very limited circumstances. Consequently, the R&D priorities memo is created collaboratively by both and jointly issued.

3. In contrast to the US structure, many other countries have cabinet-level ministries, such as a ministry of research and technology or research and education. As a result, their budgeting and coordination processes are simplified and streamlined.

Chapter 3

1. As noted in section 2.1, however, academic institutions are expanding their portfolios in applied R&D as a way to expand the opportunity space for funding, contribute in more direct ways to the creation of products and services that benefit society, and build collaborative partnerships with the private sector (chapter 12).

2. The ultimate administrative structure of NSF was notably different than what Dr. Bush envisioned owing to President Truman's differing view.

Chapter 4

1. In science, the term "paradigm" sometimes is used to describe approaches to research involving theory, observation, experimentation, computational simulation, and data-driven discovery.

Chapter 5

1. Here, the word "laboratory" is applied very generally to all disciplines and simply refers to a notebook that captures process-oriented information about your work, as well as results as the work proceeds.

Chapter 6

1. Because the structure of grant proposals varies so dramatically among funding sources, I do not present here examples of the various components of such proposals or the many varied guidelines that exist for preparing them. Instead, exercises are provided at the end of this chapter for you to develop your own proposal by examining proposals available online using guidance provided by funding sources. In completing those exercises, it is important that you work with an experienced colleague, at your institution or another, to guide your work.

2. Exceptions do of course exist, such as with the DOE Office of Science.

3. Universities often also refer to F&A as overhead, which has an entirely different meaning in the private sector and can lead to additional confusion (Droegemeier 2018).

4. In reality, the term "modified total direct costs" is used because some budget components are excluded from the F&A calculation, including student tuition and equipment exceeding a certain value.

Chapter 7

1. Although often used interchangeably, the terms "merit review" and "peer review" are different. Peer review is a general term describing any sort of scholarly review conducted by peers. It can be applied to work being proposed, as in research grant proposals, or to research outcomes, such as journal and book manuscripts, performances, scores, technological innovations, exhibits, paintings, and sculptures. Merit review is a subset of peer review whereby scholarly activity is evaluated based upon its merits, according to stated criteria. This term typically is used in the context of research grant proposals.

2. NSF uses the term "merit review" because the review process is designed to judge the merit of submitted proposals.

3. As noted in section 4.7, reproduction of research results in some fields, based solely upon information contained in a formal publication, increasingly is difficult given the complexity of tools used (e.g., computer models) and the inability of a publication to contain all of the information associated with their application.

4. A fascinating example of overturning an established paradigm is the discovery of a mathematical error in a 100-year-old theory—conceived and developed by three giants in mathematics (Bernhard Riemann, Hermann von Helmholtz and Erwin Schrödinger)—which describes how human eyes distinguish among different colors. The new study (Poling 2022) brought together elements of psychology, biology, and mathematics and has profound implications for scientific data visualization, flat panel displays, and other applications where color interpretation is foundational (e.g., textiles and paint).

Chapter 12

1. An interesting and controversial feature of the Bayh-Dole Act is the "march-in rights" provision, which allows the federal government, acting in its interest or on behalf of another party, to bypass the ownership dimensions of the Act and grant IP licenses to others, provided certain criteria are satisfied. To date, no march-in rights have been exercised.

Chapter 14

1. According to the Organisation for Economic Co-operation and Development (http://oecd.org/sdd/purchasingpowerparities-frequentlyaskedquestionsfaqs.htm#FAQ1), "PPPs are the rates

of currency conversion that equalize the purchasing power of different currencies by eliminating the differences in price levels between countries. In their simplest form, PPPs are simply price relatives that show the ratio of the prices in national currencies of the same good or service in different countries. PPPs are also calculated for product groups and for each of the various levels of aggregation up to and including GDP."

2. According to the International Monetary Fund (https://www.imf.org/external/pubs/ft/fandd/basics/gdp.htm), "GDP measures the monetary value of final goods and services—that is, those that are bought by the final user—produced in a country in a given period of time (say a quarter or a year). It counts all of the output generated within the borders of a country. GDP is composed of goods and services produced for sale in the market and also includes some nonmarket production, such as defense or education services provided by the government."

The MIT Press would like to thank the anonymous peer reviewers who provided comments on drafts of this book. The generous work of academic experts is essential for establishing the authority and quality of our publications. We acknowledge with gratitude the contributions of these otherwise uncredited readers.

This book was set in Times Roman by Westchester Publishing Services, Danbury, CT.

Library of Congress Cataloging-in-Publication Data

Names: Droegemeier, Kelvin, 1958– author.
Title: Demystifying the academic research enterprise : becoming a successful scholar in a complex and competitive environment / Kelvin K. Droegemeier.
Description: Cambridge, Massachusetts : The MIT Press, [2023] | Includes bibliographical references and index.
Identifiers: LCCN 2022062131 (print) | LCCN 2022062132 (ebook) | ISBN 9780262547079 (paperback) | ISBN 9780262377218 (epub) | ISBN 9780262377201 (pdf)
Subjects: LCSH: Universities and colleges—Research—United States. | Research—Moral and ethical aspects—United States. | Research—Methodology. | Learning and scholarship—United States.
Classification: LCC LB2326.3 .D76 2023 (print) | LCC LB2326.3 (ebook) | DDC 378.0072—dc23/eng/20230512
LC record available at https://lccn.loc.gov/2022062131
LC ebook record available at https://lccn.loc.gov/2022062132