



Online Ethics Center
FOR ENGINEERING AND SCIENCE

Topics: Mentoring

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Description

A guide that provides information and resources on teaching responsible conduct of research that focuses on the topic of mentoring. Part of the Resources for Research Ethics Education collection.

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Summary

Definition

Definition of a mentor (NAS, 1997):

In the broad sense intended here, a mentor is someone who takes a special interest in helping another person develop into a successful professional.

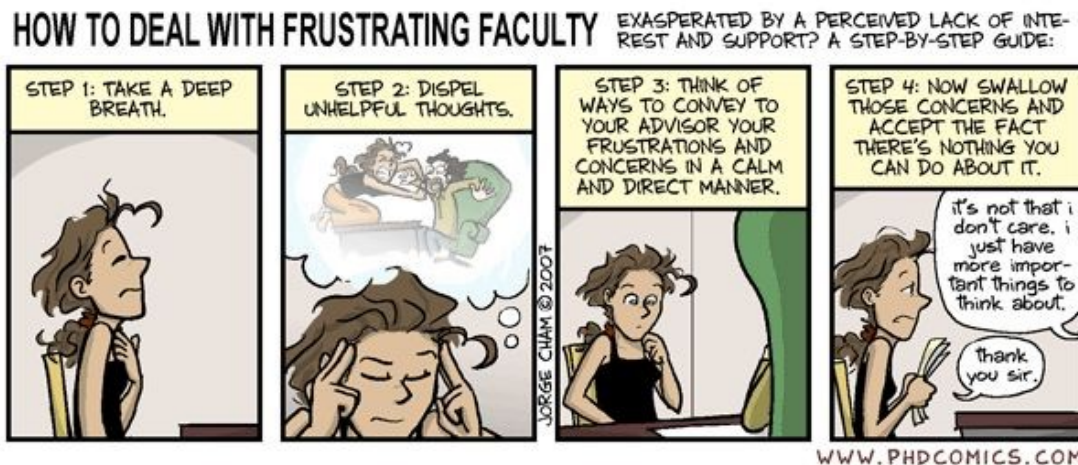


Image from *Piled Higher and Deeper* by Jorge Cham
<http://www.phdcomics.com/comics/archive.php?comid=892>

A mentor:

1. Has **experience** with the challenges that will be faced by a mentee

2. **Communicates experience** to the mentee
3. **Assists the mentee in understanding and adhering to the standards of conduct** within their profession
4. **Teaches responsible conduct** explicitly and by example

Mentoring involves both:

- what is verbalized and
- what is demonstrated in practice.



Image from <http://www.glasbergen.com...>

Background

Why is mentorship an ethical concern?

Effective mentoring is essential to the future of science

Mentoring:

- Should encompass **ethical discussions about best research practices** including authorship, collaboration, conflicts of interest, data management and more.
- By senior researchers passes **informal and often unwritten standards** from one generation of scientists to the next.

Such mentoring may readily occur within a small research group, but:

- Some research groups are **too large or competitive**.
- Issues of responsible conduct are **discussed infrequently** (Anderson et al. 1994).

An absence of effective mentoring means that:

- Principles of decision-making are not explicit and are therefore **open to interpretation and misinterpretation**.
- Many important roles of scientists, such as peer review and negotiating collaborations, are **not explicitly introduced** to the mentee.
- **The integrity of research is at risk** (Wright et al., 2008).

What does effective mentorship look like?

Effective, ethical, and successful mentors should:

- Help mentees in their **technical development**
- **Inspire** mentees in their current work
- Provide advice on working in **teams and leadership**
- **Socialize** mentees in the political, ethical, economic, and social dynamics of academia
- Inform about **administration, planning, and budget management**
- Address **special circumstances** related to gender, race, national origin, language, or disability
- Teach about **teaching and mentoring**
- Assist mentees with the **job market**

Add mentor roles image Image from <https://www.insidehighered.com...>

Regulations and Guidelines

Responsibilities of Mentors and Mentees

Many excellent resources are available to learn about guidelines, best practices, and recommendations for effective mentoring (e.g., Swazey and Anderson, 1996; NAS, 1997; University of Michigan, 2010, 2011).

Importance of Mentoring

- The importance of mentoring for training in the responsible conduct of research has been recognized in both **research studies** (Anderson et al., 1994; Swazey and Anderson, 1996; Douglas-Vidas et al., 2001; Wright et al., 2008) and **national reports** on the integrity of research (Institute of Medicine, 1989; NAS, 1997).
- For example, the Institute of Medicine (1989) noted the importance of mentors and specifically recommended that departments and research units should **monitor the supervision and training of young scientists** to ensure that it is adequate (Committee on Science, Engineering, and Public Policy, 2000).

Need for Multiple Mentors

- Some students, particularly those working in large laboratories and institutions, find it **difficult to develop a close relationship with** their faculty adviser or laboratory director.
- They might have to **find their mentor elsewhere** - perhaps a fellow student, another faculty member, a wise friend, or another person with experience who offers continuing guidance and support.
- Additionally, widely ranging needs at different stages of a career are **not likely to be met by a single mentor**, and few established scientists can offer the requisite time, knowledge, and interest to the full range of issues likely to confront a mentee.

Mentor Responsibilities

- **Guide** rather than decide for your mentee
- **Seek out mentees** whose personality aligns with yours
- **Model** good skills and behavior

Mentee Responsibilities

- Seek out as **many mentors** as needed, each of whom can provide the expertise and experience to help fulfill your needs
- **Seek out a mentor** who's personality aligns with yours
- **Act based on your own values, goals, and experience**

Discussion Questions

Questions for mentors

1. Discuss the role of mentoring in promoting the responsible conduct of research.
2. What are the roles and responsibilities of principal investigators in promoting effective mentoring relationships?
3. About which aspects of your career path did you feel least prepared?
4. What mentors have you had in the past that have helped you get where you currently are?
5. What are the characteristics of an effective mentor? What similarities and differences characterize mentors and supervisors?
6. What do you currently do well as a mentor?
7. What do you think you could improve upon as a mentor?
8. Do you think that any of the items listed for [“Effective Mentoring”](#) are outside your responsibility? Why or why not?

Questions for mentees

1. Discuss the role of mentoring in promoting the responsible conduct of research.
2. What are the roles and responsibilities of mentees in promoting effective mentoring relationships?
3. About which aspects of your career path do you feel least prepared? Who, or what kinds of people would be best positioned to help fill your needs? How might you initiate or promote a role for one of these people as your mentor?
4. What are the characteristics of an effective mentor? What similarities and differences characterize mentors and supervisors?
5. What guidelines or programs are in place to promote mentoring in your institution?

6. What does your current mentor(s) do well? What could your current mentor(s) improve upon?
7. Where else could you look to receive mentoring?

Case Study 1

Bill and Sara meet in an introductory graduate course and over the span of the upcoming academic year, fall in love and get married. At the beginning of the second year they select different mentors in the same department and begin their dissertation research. The mentors and their groups frequently collaborate and co-author publications. They both work extremely hard, but frequently has Bill help her in the lab. On weekends they are commonly seen working together doing experiments which are exclusively part of Sara's research project. Over the course of the next three years Sara prepares 6 senior authored manuscripts and all are published in peer-reviewed journals. Bill is not included as an author on any of the papers, but he is acknowledged in 5 of them. In her last year in the program, Sara wins the prestigious graduate student honors day award and is also selected by the departmental faculty to receive the outstanding graduate student annual award. Recently, Sara has been offered a permanent position in a biotechnology company. Bill is not likely to be finished with his dissertation research anytime soon, and has no publications or even abstracts to his name. A small group of graduate students meet with you, the departmental chair, and bitterly complain that Sara has had an unfair advantage during her graduate research career. They claim her publication record is deceptive as it fails to account for all the "extra collaborative help" she received from her spouse. They claim both she and her mentor are party to inappropriate practices. They want you to intervene in some way.

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Case Study 2

Dr. Mentor has had an active research program for 20 years and is well respected by his peers and his mentees. Because of his reputation and the caliber of his work, he has always attracted extremely talented graduate students to his laboratory. For a variety of reasons, Dr. Mentor's department has recently been accepting more students into the program, resulting in a greater range of ability. One of these new students, Ricky Trainee, showed some promise, but after 5 years in Dr. Mentor's laboratory, it is clear that Ricky is probably one of the worst students Dr. Mentor has ever trained. Ricky is certainly competent, but he does not stand out for his

creativity, his ability to grasp new concepts easily, his willingness to work hard, or his ability to write. Nonetheless, Ricky's work will be sufficient to complete the program. Ricky has asked Dr. Mentor for a letter of support for his applications for postdoctoral positions in one of the two leading groups in his field of research.

This case was contributed by Dr. Michael Kalichman (kalichman@ucsd.edu) of the University of California, San Diego. ©1999

Case Study 3

Amos Jones was accepted to an excellent graduate program in molecular biology. The faculty was relatively small but there were two outstanding professors, Claire Cheng and Patricia Slocum, who really determined the quality of the graduate program. Amos had been encouraged to train under Dr. Slocum by his undergraduate advisor.

Amos planned to do rotations in both the Cheng and Slocum laboratories. When inquiring about the research activities in the labs, Amos was told by Dr. Slocum's trainees that whether for a rotation or a thesis, Amos would be given a specific project, he would be expected to communicate results only to his direct supervisor, and he would have to give a formal presentation on the progress of his research once every two months. They noted that daily handwritten and dated entries were required for their laboratory notebooks. Much of the work had potential for commercial applications, so the laboratory was locked even during the day, with entry limited to the staff. The graduate students were reluctant to describe their experiments. The pace was very intense and trainees were required to prepare abstracts for the two important national meetings every year. The trainees also noted that many famous investigators visited the lab, spending time in formal and informal scientific discussion. Trainees were allowed to examine copies of papers that Dr. Slocum had received for review and to discuss them at lab meetings. They also saw an occasional grant application that she was asked to review. The trainees expected to be in great demand for postgraduate fellowships.

Professor Cheng's students reflected on the openness of the laboratory and her constant and immediate availability. They thoroughly enjoyed broad scientific interplay within the lab and with investigators on campus and elsewhere. They indicated that they were encouraged to explore their own ideas and expected to select their own thesis project. The students gave no formal presentations except

when rehearsing for meetings. Progress in the laboratory was episodic rather than steady as various concepts were explored. Although their notebooks were not specifically examined, Dr. Cheng knew about every experiment and provided constructive criticisms and suggestions. Dr. Cheng did not go to many meetings and refused to show papers she received for review to her trainees. The students admitted that they felt a little out of touch with the newest developments in the field. Although Dr. Cheng did not enjoy the same prestige and reputation as that of Dr. Slocum, the trainees said Dr. Cheng's lab was a much more pleasant and collegial environment in which to work.

This case was contributed by Allan Shipp (acshipp@aamc.org) of the Association of American Medical Colleges. ©1994

Resources

- [OEC Mentors and Trainees Subject Aid](#)

A good starting point for individuals interested in learning more about the ethics of mentoring relationships, including a definition, guidelines, and key articles and readings.

- [OEC Mentors and Trainees Bibliography](#)

A bibliography of books, online resources, and articles looking at research, guides for how to mentor, and guides for how to find a mentor for yourself as a student or new researcher.

- [Instructors Guide to Prepare Research Group Leaders as Mentors](#)

These materials are designed to provide motivation and content sufficient for an instructor to lead a workshop titled: "*Mentoring for Responsible Research.*" The long-term goal is to foster an environment in which research faculty are better empowered to initiate conversations within their research groups about the responsible conduct of research. Workshop participants are introduced to rationales, content, approaches, and resources so that they will have the means to develop and implement concrete, discipline-specific strategies for research ethics mentoring.

Cited Resources

1. Anderson MS, Louis KS, Earle J (1994): Disciplinary and departmental effects on observations of faculty and graduate student misconduct. *Journal of Higher Education* 65: 331-350.

2. Brown S, Kalichman MW (1998): Effects of training in the responsible conduct of research: A survey of graduate students in experimental science. *Science and Engineering Ethics* 4: 487-498.
3. Committee on Science, Engineering, and Public Policy (2000): [Enhancing the Postdoctoral Experience for Scientists and Engineers: A Guide for Postdoctoral Scholars, Advisors, Institutions, Funding Organizations, and Disciplinary Societies](#). National Academy Press, Washington, DC.
4. Douglas-Vidas J, Ferraro A, Reichman M (2001): [Analysis of Guidelines for the Conduct of Research Adopted by Medical Schools or Their Components](#). Published online by the USPHS Office of Research Integrity.
5. Eastwood S, Derish P, Leash E, Ordway S (1996): [Ethical issues in biomedical research: Perceptions and practices of postdoctoral research fellows responding to a survey](#). *Science and Engineering Ethics* 2: 89-114.
6. Institute of Medicine (1989): [The Responsible Conduct of Research in the Health Sciences](#). National Academy Press, Washington, DC.
7. Jones NL, (2016): [Raising Scientific Experts](#). American Scientist.
8. NAS (1997): [Adviser, teacher role model, friend: On being a mentor to students in science and engineering](#). National Academic Press, Washington, DC.
9. NIH (1989): [Requirement for programs on the responsible conduct of research in National Research Service Award institutional training programs](#). NIH Guide for Grants and Contracts 18(45).
10. NIH (1992): [Reminder and update: Requirement for instruction in the responsible conduct of research in National Research Service Award institutional training grants](#). NIH Guide for Grants and Contracts 21(43).
11. Swazey JP, Anderson MS (1996): Mentors, advisors, and role models in graduate and professional education. Association of Academic Health Centers, Washington, DC.
12. University of Michigan (2010): [How to Get the Mentoring You Want: A Guide for Graduate Students](#). Rackham Graduate School.
13. University of Michigan (2011): [How to Mentor Graduate Students: A Guide for Faculty](#). Rackham Graduate School.
14. University of Wisconsin: [Resources for Each Phase of the Mentoring Relationship](#).
15. Wright DE, Titus DL, Cornelison JB (2008): [Mentoring and research misconduct: an analysis of research mentoring in closed ORI cases](#). *Sci Eng Ethics*. 2008 Sep;14(3):323-36.

Notes

The Resources for Research Ethics Education site was originally developed and maintained by Dr. Michael Kalichman, Director of the Research Ethics Program at the University of California San Diego. The site was transferred to the Online Ethics Center in 2021 with the permission of the author.

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Teaching Ethics in STEM