

Mentors, Advisors and Supervisors: Their Role in Teaching Responsible Research Conduct

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ABSTRACT: *Although the terms mentor and thesis advisor (or research supervisor) are often used interchangeably, the responsibilities associated with these roles are distinct, even when they overlap. Neither are role models necessarily mentors, though mentors are role models: good examples are necessary but not sufficient. Mentorship is both a personal and a professional relationship. It has the potential for raising a number of ethical concerns, including issues of accuracy and reliability of the information conveyed, access, stereotyping and tracking of advisees, and the abuse of power. Nevertheless, mentors can be critically important for professional success and are one of a number of elements that affect the responsible conduct of research. In addition, the community as a whole has a responsibility to mentor junior members.*

Tenure Track^{*}

Participants: Dick Matthews, Assistant Professor
Peter Shelton, Chairman, Biology Department
Sheila Barnes, Graduate Student
Sandy Gladstone, Assistant Professor

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(Dick Matthews and Peter Shelton are having lunch in the faculty dining room)

Peter: I know the last six months have been hard on you but the tenure committee has made its recommendation and the school council will vote next week. I think you can relax now.

Dick: I'm so glad it's almost over. You know, I've been writing all my life but when I sat down to write the summary of my research accomplishments I went completely blank. I must have written twenty-five drafts.

Peter *(laughing)*: That task affects everyone the same way. You have a terrific record, especially with that new article you have in press in *Physiology Today*. You took a problem that has plagued the field for ten years and turned it around so that everyone can see the solution.

Dick: Thanks. It means a lot to me to hear you say that. I'm not sure where the idea came from myself. One day I was watching Rebecca, my six-year-old, draw and she insisted that I pick up a pencil too. Earlier in the day, I'd been frustrated because experiments in the lab just weren't going the way I'd expected. I started doodling and suddenly I knew what the problem was. When I went back to the bench the answer was clear.

Peter: Well, wherever it came from, the timing couldn't have been better. I'm afraid I've got to go now; I have a student coming in at 1 o'clock. I'll see you at the seminar at four.

(Shelton picks up his tray and leaves; several minutes later, Sheila Barnes, a new graduate student in Matthews' lab, sits down at the table.)

Dick: Hi, Sheila. How is your reading going?

Sheila: It's going well. I've got a pretty good idea where I want to start. I'm going to sit down this afternoon and try to draft a research plan. Then maybe we can talk about it tomorrow.

Dick: That's great. I'll be in my office by 9.30.

Sheila: Oh, by the way, I made you a copy of the titles list from my literature search. I thought you might be interested in the article I circled from the *Canadian Journal of Biological Chemistry*. I didn't think it would be of much use to me, but the title sounds like it might be vaguely related to the preprint you sent me before I left California. It's certainly an odd place for that topic to appear.

Dick: Thanks Sheila, I'll take a look at it.

(Several hours later in Matthews' office. He puts some papers down on his desk, walks to the window, and then walks back to his desk. He picks up the papers, throws them in the trash, and then retrieves them and walks out of the room.)

(Dick Matthews walks into the office of his close friend, Sandy Gladstone.)

Dick: Sandy, I have a big problem, do you have a few minutes to talk about it?

Sandy: Just a few, I promised Elaine I'd be home by 6:30. What is it?

Dick: Do you ever read the *Canadian Journal of Biological Chemistry*?

Sandy: No, I've heard it's a good journal but I wouldn't expect it to have much relevance to my work, Why?

Dick: Well, Sheila Barnes was doing a literature search and she came up with this article by Janet Simmons. You remember Janet, we met her at the symposium two years ago in Toronto. Sandy, the article lays out the ideas in my new paper. I can't believe it. I don't remember discussing the topic in Toronto, but it's all here *(waving the papers in his hand)*. I missed it because I never read the *Canadian Journal* and I know no one else in the department does either.

Sandy: What are you going to do?

Dick: I don't know what to do. I'm sure I developed the ideas independently, and if I withdraw my paper now it might jeopardize the tenure decision.

Sandy: I don't think you have to worry about your appointment. Your record is great even without the paper. Personally, I think you just have to acknowledge Janet's work. If you don't, there might be trouble later. You certainly don't need to withdraw the paper. Couldn't you just call Jim Bascom at *Physiology Today* and tell him you need to add a footnote? Look, I've really got to go home. I'll talk to you later.

Dick: I need some time to think. Sandy, you won't tell anyone about this, will you?

Sandy: No, I won't even ask you about your decision.

(The next morning outside Matthews' office)

Sheila: Dick, thanks again for your comments on my research plan. They really helped. Oh, I almost forgot, did you find that article from the *Canadian Journal*.

Dick: No, I decided it probably didn't relate much to what we're doing.

Sheila: Oh good, the last thing I need now is something else to read.

INTRODUCTION

Mentors, advisors and supervisors all play a fundamental role in professional development. Each of these individuals also plays a formative role in the ethical development of students and trainees in the manner in which professional values and ethical standards are conveyed, both consciously and unconsciously. This occurs in the way advisors, mentors and supervisors interact with colleagues, collaborators, co-workers, and other students and trainees, as well as with the individual student him or herself. In addition, there may be written (or articulated) policies of institutions, agencies, professional societies and other professional individuals or entities that are meant to inform trainees about the standards and values of the community and may also aim to inform supervisors about the training and treatment of students, postdoctoral associates and staff. All of these elements contribute to the new, emerging researchers' understanding of the range of acceptable practices, and to their awareness of a consensus within the community regarding unacceptable practices in the profession. While some practices are a matter of convention, others reflect the standards and ethical values of the profession.

As in all relationships, embedded in the relationship between the student or trainee and his or her advisor, mentor or supervisor, are ethical issues. Among other things, these ethical situations influence the students' and trainees' understanding of their own responsibilities as they become advisors, mentors and supervisors themselves.

Education and training for a career in scientific research provide a useful illustrative context for examining the overlapping but distinct roles of advisors, mentors and supervisors. At the same time, much of what can be understood about their influence in the ethical development of graduate students in science can be extrapolated to other disciplines and fields, and to other levels from junior to senior professionals. The scenario "Tenure Track" illustrates and raises a number of issues that highlight the role of the thesis advisor as role model and potential mentor in the context of other aspects of professional life and professional demands.

MENTORS, ROLE MODELS, ADVISORS AND SUPERVISORS

It is important to distinguish between thesis advisors (or research supervisors for postdoctoral associates) who are often assumed to be mentors, and actual mentors. Mentors, advisors and supervisors each fulfill a key function in professional development. In many respects their responsibilities overlap and in some fortuitous instances these various roles are adopted by a single individual for a given trainee. However these terms cannot be used interchangeably without blurring important distinctions, sometimes with unfortunate consequences, especially for the student or trainee.

Mentors are critically important to career development and professional success. The original Mentor was a friend of Ulysses who was asked to watch over and advise his young son, Telemachus, while Ulysses went off to fight in the Trojan Wars. However the term "mentor" has come to be used more broadly.¹⁻³ Mentors are those

who are willing and able to share their experience and expertise. They reflect on their successes and failures, and can explain what they have learned. Mentors also are interested in the professional development and career advancement of those they mentor.

It is not surprising that mentoring plays a crucial role in professional success because there is so much more to being a successful science professional than knowing scientific concepts and laboratory techniques. Although books and courses are available for learning many professional skills, mentors can provide information that is specific to the field, a particular individual, and a given situation. Mentors can be essential to learning how to write and review manuscripts, how to manage a laboratory, how to obtain funding, and knowing which committees to be on and which to avoid.^a In addition, professional success requires being aware of and understanding the professional standards, conventions and ethical values of the scientific community regarding the allocation of credit for contributions, the responsibilities of authorship, the expectation of an audience to whom research findings are presented, and more. Moreover, because scientific research is carried out in the name of society as a whole (and almost always with public resources and funding) society expects that researchers will uphold its ethical values. For example, it is expected that research subjects, whether animals or human volunteers, will be treated humanely. All of this information is communicated to trainees both explicitly in the mentoring process, and implicitly by example.

Because they provide specific examples, role models can play an important part in career development. However, a role model is not necessarily a mentor since, as individuals, they may not interact with those for whom they are models. More to the point, examples are important but not enough. Role models do not necessarily (and indeed may not be able to) articulate the philosophy or policy that underlies and is reflected in their behavior.

Thinking of a mentor as one who shares experience and expertise and takes interest in the professional development of the mentee, often leads to the assumption that a thesis advisor or lab head will automatically be a mentor for a student or postdoctoral trainee. It is an obvious mentoring pair. However this is not necessarily the case. Advisors are generally officially assigned and have a particular role in the academic setting: they are responsible for ensuring that the graduate student fulfills departmental and institutional requirements for an advanced degree. Though advisors may provide advice with regard to other activities, what the administration of the institution and colleagues in the department will notice is whether one's students fulfill these requirements.

In the Acadia Institute survey of faculty and graduate students at research and educational institutions across the country, Judith Swazey, Melissa Anderson and Karen Seashore Louis^{3,4} found that the "most supportive faculty member" (i.e., the

a. It is worth noting what may be obvious: some committees increase the visibility of their members and thereby facilitate career advancement, while others can be "time sinks" that can bog down a junior researcher's career.

individual who regularly expresses interest in the student's progress, provides letters of reference, and provides research support) was not necessarily the thesis advisor. Furthermore, even the "most supportive faculty member" does not regularly, reliably, or systematically discuss professional standards, teaching techniques, or institutional politics, let alone dual career relationships or balancing one's personal and professional life. Yet all of these are topics about which a budding science professional might value advice from an experienced professional.

Nevertheless, thesis advisors should be mentors: acting as a good example and an academic advisor is necessary but not sufficient.^b Mentors need to address issues explicitly and in an organized way or critical information falls between the cracks. (The "Survival Skills" course described by Beth Fischer and Michael Zigmond elsewhere in this volume⁵ can serve as a potential alternative approach for some issues that need to be addressed.) Moreover, for those responsible for the training of junior researchers, mentoring is in some sense a professional responsibility, that is, an obligation of the role because, in agreeing to prepare students and trainees for the profession, we tacitly commit to ensuring that they are able to meet the demands of the profession.^{6,7}

The specific responsibilities of the research supervisors of postdoctoral associates are even less well defined than those of thesis advisors. However, it is even more important that they be mentors as well as supervisors, that is, that they make explicit what is usually only implied because the detailed information an experienced researcher can provide can be critical for a successful transition from postdoctoral trainee to independent researcher. Moreover, postdocs are especially in need of a supportive, well-connected senior colleague.^c

It is essential that students and trainees understand that although the terms advisor or research supervisor may be used interchangeably with mentor in the academic setting, advisors and supervisors do not necessarily or reliably take on the responsibilities of a mentor.⁹ For this reason, students and trainees should actively seek out mentors who have the experience and expertise that they need. It is also important to keep in mind that a mentoring relationship is a personal as well as a professional relationship. Thus, those seeking mentors should look for individuals with whom they are compatible.

Unless the differences between mentors, role models, advisors and supervisors are clarified, unfulfilled expectations can quickly undermine the trust that is required for each of these to be a successful relationship.

b. In fact thesis advisors (and research supervisors) should be one of several mentors since no single science professional is likely to know everything that a given trainee needs to learn in order to be successful in his or her chosen career path.

c. Indeed junior faculty, too (and the departments and institutions of which they are a part), would benefit greatly from formal mentoring.⁸

QUALITIES OF MENTORS

The mythic beginnings of the concept of mentor may lead to the expectation of an idealized mentor: someone who is omniscient, wise, sensitive and powerful. Of course this is an exaggeration, however, there does tend to be an over-expectation, on the part of both the mentor and the individual being mentored, about what a mentor can and will provide.

Not everyone is a good mentor naturally, but almost everyone can become a good mentor with motivation and training. A number of qualities have been identified as those that should be sought or cultivated in a mentor.^{6,10} Some qualities are essential like **experience**; **insight** into what works and what does not; **enthusiasm** for one's field, discipline or profession; and a **positive outlook** with regard to one's career choice. Like a **sense of humor**, the **ability to articulate and address sensitive issues** is helpful in dealing with the realities and needs of relationships. Certainly the capacity to be both a good questioner and a good listener, to be able to help identify and evaluate underlying assumptions, and to be able to help examine difficult choices all are extremely useful to both the mentor and the mentee.

Still other qualities highlight some of the ethical issues inherent in mentorship:

- **high standards and expectations** for oneself, and ones colleagues and trainees,
- **a willingness to expend time and effort** to provide relevant mentorship,
- **a belief that individuals can and should “do science” regardless of gender or ethnicity**,
- an **open mind** with regard both to complex issues such as definitions of “success” in science (e.g., Nobel prize winners are not the only successful science professionals), and to the changing nature of the scientific community and its support structures,
- an **appreciation of diversity** in perspective and world view.

ETHICAL ISSUES IN MENTORING

Mentoring raises a number of ethical issues. Most obvious are those associated with the integrity of the practice of research itself and how and whether it is conveyed accurately. Moreover, because mentorship is a personal as well as a professional relationship, and a relationship in which the power may be unevenly distributed, it can also raise issues associated with access, stereotyping and tracking, and the misuse of power. Also to be considered is the shared responsibility of the community for the mentorship of its junior members. (See also the article by Vivian Weil “Mentoring: Some Ethical Considerations”¹¹ elsewhere in this volume.)

The Responsible Conduct of Research

As indicated above, mentors, advisors and research supervisors play a unique and critical role in conveying to trainees professional standards and ethical values. It is essential that they uphold high standards for themselves and for their colleagues and trainees. The behavior of senior professionals, the response of senior professionals to

the behavior of other students, trainees and established professionals, the congruence or mismatch between behavior and articulated policies: each of these to some degree or another, correctly or incorrectly, communicates the range of accepted practice, shared views regarding what is unacceptable, and how seriously members of the community regard deviations from what is considered acceptable. However, behavior and the values that underlie it need to be articulated and perhaps explained; otherwise the observed behaviour is open to interpretation—and misinterpretation: Why is this practice acceptable and others not? Are other practices acceptable? Is one or another practice preferable? What are the assumptions that underlie particular practices? What are the short and long term implications of a particular practice? While professional standards and values should be, and indeed may be, reflected in behavior, setting a good example without clarifying the underlying policy or philosophy leaves too much room for misunderstanding: even exemplary behaviour can be a mystery, especially to those from other cultures.

Funders, colleagues and employers expect that those who attain a senior rank commensurate with independent work are aware of and accept the values and standards of the community, and that they will function accordingly. Thus it is expected that they will know how to properly cite the work of others, for example. Failure to do so is considered culpable, regardless of whether one has actually been formally instructed in citation practices (personal communication, Office of the Inspector General, National Science Foundation, 1995). Those who train junior researchers who are expected to work independently are not fulfilling their responsibilities as educators (i.e., to adequately prepare trainees) if those they train are not able to fulfill such a standard.

Even when trainees know what is the ethically preferable practice (for example regarding criteria for authorship or strategies for data selection), they may choose to adopt a questionable practice if they believe such behaviour is more likely to facilitate their career advancement.¹² Thus it is essential that advisors, mentors, faculty and colleagues throughout the discipline clearly identify and uphold high standards.¹³

Access

A second ethical consideration is fairness, that is, how do we assure that everyone has access to the information that is essential for success? Recognition of differential mentoring by lab heads and thesis advisors raises a central conflict that is not easily resolved. On the one hand, mentoring is critical for success because it can provide a conduit for conveying to junior researchers the often unwritten, implicit, even unrecognised, yet key skills and concepts that one needs in order to take best advantage of one's own skills, talents and knowledge. At the same time, there is no clear, reliable mechanism for assuring that everyone has a mentor (Never mind the several mentors that are actually what is needed!)

Mentoring relationships are usually initiated by the mentor, sometimes with the assistance and/or prodding of the mentee. This is not surprising, or even inappropriate, given that it is a personal as well as a professional relationship. In addition, although mentoring is usually a fulfilling and rewarding experience in its own right, it is generally not rewarded or facilitated, or even encouraged in any practical sense by

academic institutions or in the private sector. As a result, mentors most frequently choose to mentor individuals with whom they empathize, which usually means those who remind them of themselves. Thus, while everyone who obtains an advanced degree has a thesis advisor, many junior researchers do not have mentors. Moreover, because the demographics of U.S. science are generally white and male, as is often observed, it is largely members of groups already under-represented in science who go without mentors.

While everyone needs mentoring, members of some groups need mentoring even more. Women, members of ethnic minorities, those with disabilities, and those from circumstances where less emphasis is placed on higher education may have low expectations of themselves or may be perceived by others as being less likely to succeed. Given the way in which important decisions about career advancement are made, they may need the added insight of mentors in order to overcome the tracking, lowered self-esteem, and other obstacles that result from low expectations. For example, female undergraduate and graduate student participants in the mentoring program of the Association for Women in Science (AWIS) found the program especially helpful in addressing what they perceived as obstacles to their continued pursuit of a career in science, namely: (1) a sense of isolation; (2) the seeming cultural contradiction of being a woman and being a scientist; (3) the apparent difficulty in having a career in science that is part of one's life, not one's entire life; (4) the need for viable, diverse paths to success; and (5) the need for a range of career options.¹⁴

Foreign students may also need extra help in deciphering the unarticulated aspects of research practice. For example, in some cultures plagiarism is a high form of compliment so individuals from those cultures need help in understanding that it is not only NOT universally acceptable, but, in the Western scientific community, it is prohibited.

Mentoring, advising and supervising all take time and effort. Although it is quite possible to have a useful brief exchange in the elevator or while passing in the hallway, the value of that exchange is predicated on a foundation of conversations and active listening that provides a meaningful context. It is not uncommon for lab heads to have more competing professional commitments and more students and/or trainees than can be adequately dealt with. Individuals and institutions that do not acknowledge the time and effort that is required to do a competent job are short-changing the students and postdoctoral associates that they have agreed to educate and train. To some degree, institutions need to more realistically recognize the actual requirements and time constraints of adequate mentoring and advising. (For example, both the Graduate College of the University of Illinois and Harvard Medical School have awards that honor good mentors.)

Often valuable mentoring occurs in an informal setting: over coffee, on the golf course, over dinner at a professional meeting, or over beer on Friday after work, usually in a small group, sometimes one-on-one. On these occasions, conversations about departmental or institutional politics, or about the policies that direct committees or are formulated by them, are likely to take place. These kinds of topics provide insight both into the inner workings of the system, and into the standards, values and

expectations of the community. Yet these informal occasions for mentoring presume that the mentee is available and has the same outside interest as the mentor. However, family commitments or religious constraints can preclude taking time after work for a beer with the head of the lab. In addition, some activities are not perceived as co-ed activities. As a result, some individuals are excluded, intentionally or unintentionally, from partaking of the camaraderie as well as the specific insights that may develop in these settings. Mentors, thesis advisors and research supervisors need to be cognizant of the fact that differential participation on the part of students and trainees in informal activities can easily result in differing degrees of mentoring. To compensate for these differences, mentors need to be aware of the mentoring aspects of informal activities and make sure that trainees and students who are unable to participate, learn about that information in another setting, e.g., a continuation of the discussion in an informal lab meeting.

Stereotyping and Tracking

Because science professionals are members of society who are socialized long before they become active members of the scientific community, they bring to their participation in the community their social perceptions and values. Although it is no longer acceptable to articulate doubt in the capacity of females in general to “do science”, for many the under-representation of women in science, especially the physical sciences, continues to be support enough for the premise.

Women must also deal with unconscious expectations regarding their appropriate role and responsibilities as a member of a research team. By some they may be commonly regarded as the note takers, typists, confidantes, peace makers, social organizers or teachers, or the ones who make the coffee. Unconscious, sometimes opposing expectations on the part of research supervisors or even individuals themselves about what they can and should be doing as members of the research team, can dissipate the professional energy and focus of female students, trainees and staff.

Similarly, thesis advisors, research supervisors, and mentors bring a wealth of experience, often strong and sometimes rather narrow and unreflective views about what qualities and skills are required to succeed as a science professional, e.g., single-mindedness, determination, curiosity, logical thinking, the “killer instinct”. This in spite of the fact that diversity of approaches, perspectives and world views enable a research team to approach a research problem from a variety of directions and can facilitate creative problem-solving. Bias regarding which qualities are essential for success can lead to tracking of students or trainees into one career path or another (for example, education rather than basic research) without regard to the individuals’ preferences or professional goals, or even the actual qualities that do correlate positively with success in a given career.

Misuse of Power

The powerful position of the thesis advisor, supervisor and mentor has the potential for inappropriately influencing or even directing the choices of the student or trainee irrespective of the goals, values, needs or interests of the junior researcher. Both the

mentor and the mentee need to recognize that the advice of the mentor must be evaluated by the trainee in light of that individual's personal and professional values, resources and other relevant factors.

The differential power of these relationships also has the potential for abuse in other respects. Thesis advisors have been known to change the requirements of a thesis inappropriately in order to delay completion of the degree when a student is especially talented or capable in providing computing or electronic skills to the research group. Research supervisors, too, have been known to retard the career advancement of trainees who make an especially valuable contribution to the team. Mentoring, advising and supervising relationships have all been known to develop into sexual relationships for complex and not so complex reasons.¹⁵

Mentoring is a responsibility of the community

Educational and research institutions and other segments of the research community, such as professional societies, should encourage and facilitate mentoring. Institutions and scientific organizations are ideally situated to send the message that mentoring is important. Since not everyone is a naturally good mentor, institutions and professional societies should develop programs that train individuals to become effective mentors. (Through the AWIS Mentoring Project, chapters of the Association developed a range of mentoring programs and activities. The national organization identified features of these programs that were particularly effective and could be generalized to academic institutions and various types of professional organizations.¹⁴) Organizations and institutions can encourage mentoring through a reward system (e.g. the AAAS annual recognition of an outstanding mentor as well as awards established by institutions like the Graduate College of the University of Illinois and the Harvard Medical School cited above), and institutions can provide compensatory time that recognizes that time is finite and limited, and that adequate advising, supervising and mentoring require time. In addition to providing training for mentors, professional societies and institutions can facilitate the mentoring process by setting up mentoring programs that create settings in which mentors, students and trainees can discuss various aspects of professionalism that highlight community expectations regarding professional standards and ethical values, including such topics as: criteria for authorship, data selection and interpretation, reproducibility of data, dealing with allegations of scientific misconduct, the presentation of research findings, ownership of ideas and intellectual property, conflicts of interest, humane treatment of research subjects, and the responsibilities of mentors.

WHAT TO EXPECT OF AN ADVISING OR MENTORING RELATIONSHIP

Because a mentoring relationship is a personal as well as a professional relationship, mentees should realize that it will be governed by the style, attributes, and chemistry of the individuals involved. While it is unrealistic to expect mentors to be omniscient, wise, sensitive and powerful, it is reasonable to expect that mentors—and advisors—

will respond to questions and be able to articulate their policies with respect to such issues as authorship and publication practices. Trainees should also be able to expect that mentors and advisors will respond to requests for help, treat all members of the research group fairly, and keep their word.

Similarly, mentors and advisors should be able to expect advisees to pay attention and provide feedback regarding the adequacy of the advice they are receiving. These relationships need to be built on candor, trust and open communication.

In addition and less obviously, both mentors and mentees should expect that advice will be recognized for what it is: a suggestion regarding a problem or set of circumstances that is based on a unique perspective which is framed by the experiences, values and goals of the mentor. As a result, mentors and mentees should expect that advisees will not necessarily follow the advice they are given. It is essential that students evaluate the advice they receive in the context of their own values, goals, needs, resources and experience.⁶

“TENURE TRACK” REVISITED

In the scenario “Tenure Track”, it is clear that Dick Matthews is not setting a good example for his graduate student Sheila Barnes. Perhaps not surprisingly, he allows the tension and anxiety created by the tenure decision to interfere with his judgement regarding how to appropriately acknowledge the work of others. While there is no reason to believe Dick necessarily obtained the ideas for his important paper from colleague Janet Simmons, it is appropriate, diplomatic and not uncommon (although awkward if the Simmons manuscript has been published for long) for Dick to check with the journal editor and add a note at the proof stage.

Even more troubling, is the final exchange Dick has with Sheila. Indeed colleagues often identify the fact that Dick lied to Sheila as the most problematic of all the issues raised in this scenario. When she learns, as she surely will given that she is working with Dick and the apparent importance of the finding described in Dick’s (and Janet Simmons’) paper, Sheila’s confidence and trust in Dick is bound to be affected. In addition, Dick has undermined to some degree both Sheila’s confidence and her capacity to engage in one of the key skills one develops as a graduate student: the capacity to distinguish potentially relevant literature from irrelevant literature based on the title of a paper.

As the scenario stands it poses an ethical dilemma: what should Dick do next? One solution is for Dick to tell a second lie: to seek out Sheila later that same day and tell her that he thought more about it, and tracked down the article by Janet Simmons. He could then explain how he plans to acknowledge the Simmons article in the paper he has in press. Alternatively, he could confess the lie to Sheila (some believe thereby undermining his relationship with her), and explain the circumstances that led him to do it. Both of these solutions have been suggested (along with a variety of additional considerations and modifications) by faculty, postdocs and graduate students in a number of settings in which I have presented this scenario. Invariably, concern is

expressed by participants because the advisor-advisee relationship is critically important for the future of both the student and the scientific community itself.

CONCLUSION

The critical role of mentors as distinct from advisors and supervisors (whether or not they overlap in the same individual), needs to be acknowledged and supported by the community as a whole since mentoring is in some sense a responsibility of the entire community. In myriad ways academic and professional institutions and organizations can recognize, reward and facilitate mentorship.

Mentors, advisors and research supervisors inform and enrich the education and training of junior researchers both in ways they intend, and in ways they cannot foresee. As part of the process, more senior professionals have a substantial impact on the way in which students and trainees come to understand the ethical standards and values of the professional community of which they are all a part. Thus, mentoring provides an opportunity for the community to contribute to the ethical development of junior professionals. Moreover, by identifying and clarifying professional standards and ethical values we have the opportunity to examine the underlying assumptions these standards and values reflect, and to consider and evaluate the long term implications of these values and standards for both the scientific community and society as a whole. Junior researchers also begin to understand how the community itself understands its relationship with, and responsibility to, the larger society. It is an opportunity not to be missed.

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