Editorial Introduction:

Mentoring and the Responsible Conduct of Research: Reflections and Future

Stephanie J. Bird and Robert L. Sprague

In the natural history of most sciences, an area begins with serious, scholarly critiques of the extant problems. One might call this the question formation stage. Then some begin to further define the issues and attempt to classify and count some of the items and events so classified. This is the beginning of the quantification stage. Based on these counts and data obtained, some of the more theoretically oriented scholars begin to mull over the data and reflect on their meaning. This is the beginning of the final, mature stage of theory building. The study of mentoring that many educators and researchers acknowledge is key to the future health of science, is not at this final stage but may be approaching it. This volume consists of several papers that are thoughtful, philosophical pieces and there are also papers that involve the collection of data and interpretation of that data. This may be the foundation upon which some beginning theory can be built. Certainly the study of mentoring needs to move in this direction because science progresses more rapidly by using a thoughtful theory to guide its path.

This special issue of Science and Engineering Ethics is composed primarily of papers that were originally developed from presentations at a small workshop entitled “Mentoring and Research Values: Students as Future Vital Human Resources” organized by Robert L. Sprague and Glyn C. Roberts in 1995. The aim of this conference, sponsored by the National Science Foundation, was to explore the findings of various researchers about faculty and student perceptions of mentoring in order to integrate then with the findings of a survey on the development of ethical beliefs. Initially intended to be book chapters, some of these papers have undergone considerable revision and updating and in some cases bear little resemblance to the original. Together they provide a multifaceted consideration of both mentoring itself

Also because they were originally intended to be book chapters, these articles have not undergone standard Science and Engineering Ethics double blind peer review.

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and its relevance to teaching the responsible conduct of research. Over the last decade, both mentoring and the responsible conduct of research have received increasing attention from the scientific community. This volume represents a rare examination of these topics in relation to one another.

Not surprisingly, consideration of mentoring and the responsible conduct of research within the pages of Science and Engineering Ethics not only focuses on the various forms of mentoring and its importance in the education and training of science professionals, but also on the ethical issues that mentoring raises and the relationship between mentoring and the responsible conduct of research. In this editorial we highlight recurring issues and themes, and some noteworthy findings.

**Mentoring**

A number of thoughtful and complimentary examinations of the concept of “mentor” emphasize the complexity of this multidimensional role, and the range of representations of mentorship along the continuum from a professional to a more personal relationship. While there is general agreement that mentors can be critically important to professional success, there is also agreement that there are few ideal mentors. The inconsistency of these two observations begs the question: How does the scientific community fulfill its responsibility to trainees, society as a whole, and to itself to prepare fully the next generation of science professionals without relying solely on “the good deeds of saints and heroes” (p. 479). Buried in this discussion is the tension between opposing perceptions of graduate education: Is it to weed out those that cannot contribute to the scientific enterprise, or is it to nurture those with the intelligence and inclination to do science? To the extent that it is the latter, the aims, goals and tasks of mentoring must be addressed. It seems inappropriate to assign mentors for at least three reasons: (1) it is a personal as well as a professional relationship, (2) not everyone is naturally good at mentoring, nor can everyone be trained to be an acceptable mentor, and (3) there are toxic mentors. Yet given the importance of mentors, trainees need explicit encouragement to seek out multiple mentors and directions in what to look for in a mentor. In addition, training in the elements of mentoring should become a standard component of professional education.

The long term health of the academic community also requires that the aims, goals and tasks of mentoring be addressed. For example, it is quite disturbing to discover in the piece by Anderson, Oju, and Faulkner that almost two-thirds of the graduate students placed in the classroom as teaching assistants had no instruction by their department in principles of teaching. One of the common complaints among lower division undergraduate students is about the poor quality of teaching provided by teaching assistants. To educators this situation is untenable. Departments have the responsibility of preparing their teaching assistants for work in the classroom. Hopefully, this volume will publicize this gap in training and redirect the efforts of lagging departments.
In addition to the standard mentoring model, multiple mentors, mentoring in small groups, and “survival skills” workshops and courses can all complement each other while addressing the educational and training needs of both emerging scientists and the community. Implicit in this multifaceted approach, and central to the success of the process, are not only the cooperation but the active support and participation of all members of the community.

**The Responsible Conduct of Research**

Most people want to “do the right thing”. Thus, among the needs of the scientific community is explicit education regarding the responsible conduct of research., that is, what the community expects of its members, its professional standards and ethical values. Yet it is clear from the work of Susan Eastwood and colleagues that education is not enough. Trainees, indeed all members of the community, need to be supported in doing the right thing and not encouraged to do the wrong thing by being, or seeing others, rewarded for doing the wrong thing. In short, the community as a whole needs to work together to create an environment/climate that supports, encourages and rewards the responsible conduct of research. Mentors are one, but only one, component of that setting.

**REFERENCES**