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The ethics perspective of physics department chairs

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How is ethics knowledge shared in the physics community, and what is the state of ethical practices in physics departments? The Ethics Committee of the American Physical Society (APS) wanted those questions to be answered by key members of physics departments: students, postdocs, and faculty.

According to the Effective Practices for Physics Programs guide, developed by APS and the American Association of Physics Teachers, "Ethics is a cornerstone of effective scientific practice. . . . Ensuring that all physicists behave ethically maintains the integrity of physics as a discipline and supports public trust in physics and in science as a whole."[1] Physics departments at colleges and universities across the US and around the world play a vital role in the education of future physics professionals. Ethics education—for instance, offered formally through a course or webinar, informally through examples set by mentors and advisers, or discussions in a research group—is an essential part of a physics education.

The APS Ethics Committee, which the three of us were part of, distributed a survey in 2020 to graduate students and early-career APS members who had obtained their PhD within the past five years. (See our article in Physics Today, January 2023, page 28.) The survey was a follow-up to a similar one in 2003, which looked specifically at how ethics are taught and at how aware so-called junior members, those who earned their PhD within three years of the survey, were of ethical practices in physics. (See the article by two of us, Kirby and Houle, in Physics Today, November 2004, page 42.) The responses to the 2020 survey, hereafter called the early-career survey, show that unethical research practices and harassment continue to be a significant problem in the physics community but go largely unreported for various reasons.

In parallel with the early-career survey, the APS Ethics Committee also polled the chairs of physics departments. The ethics questions were part of the biennial Academic Workforce Survey, which was carried out in March 2020 by the Statistical Research Center of the American Institute of Physics (publisher of Physics Today). Responses were received from 622 of 766 degree-granting physics departments (81%). The intent of the survey was to understand the perspective of chairs regarding ethics and ethics education in their departments. In this article we first summarize the principal results from the department chairs survey and then compare the results with those from the early-career survey. The different perspectives of department chairs and early-career APS members reveal concerns and opportunities for physics departments to better support a culture of ethics.

The findings

Our 10 most striking findings from the department chair survey are listed in the box on page 24. In many cases, the responses from PhD-granting and bachelors-only programs were not significantly different. Departments granting bachelors degrees only, however, are more likely to report that all faculty must take ethics training, less likely to offer a semester-long course on ethics, and more likely to report zero ethics violations. A number of department chairs from bachelors-only programs pointed out that because the survey questions seemed to assume that graduate students were in their

Ethics in physics departments

These ethics findings, listed from least common to most common, are from a survey, funded by the American Physical Society (APS) and conducted by the American Institute of Physics (publisher of PHYSICS TODAY), of physics department chairs.

10. One chair in 10 (10%) does not know whether full-time faculty members are aware of the procedures to report ethics violations.
9. At least one chair in five (about 20%) does not know whether part-time faculty, postdocs, and graduate and undergraduate students are familiar with the procedures to report ethics violations.
8. About one-third (35%) of the chairs do not believe that the institutional processes are adequate to enforce ethical behavior and ensure that justice is served.
7. Less than half (40%) the chairs believe that their graduate students have a good understanding of what constitutes ethical behavior in science.
6. Almost half the chairs (45%) report that their department does not offer ethics training.
5. More than half (59%) the chairs believe that the procedures are clear for following up on the progress and resolution of any reported ethics violation.
4. About two-thirds of the chairs (65%) believe that the procedures for following up on progress and resolution of any reported ethics violation are readily available.
3. Two-thirds of the chairs (66%) report having no ethics violations in the past five years.
2. Three-fourths of the chairs (74%) believe that APS has a role in providing ethics training.
1. A large majority of chairs (85%) believe that most of their faculty members have a good understanding of what constitutes ethical behavior in science.

program, they were difficult to answer, but we do not believe that that significantly affected the results.

Although the particular questions and the response rates from the early-career and department chair surveys were quite different, several responses seem consistent. We focus, however, on the discordant messages from the two sets of results.

Figure 1 contrasts how department chairs and early-career scientists responded to the question of ethics training. Nearly half the chairs reported that their departments do not provide ethics training. For those who said that training is offered, most singled out webinars or online modules as the main type. By contrast, only 4% of the early-career APS members said that they did not have ethics training. The difference comes about because 40% of the early-career respondents said that they received their ethics training through their research group. That is potentially problematic because many ethical dilemmas, such as pressure to falsify data, come from research supervisors.

In the early-career survey, graduate students and other early-career participants were asked to recommend the kinds of trainings that they thought would be useful. Among the most suggested types were courses, workshops, seminars, and discussions on such topics as how to treat people, organize a research record, and write a paper. Opinions on the value of Web-based trainings were mixed: Some said that they were useful, whereas others pointed to the value of in-person discussions to help illustrate the gray areas in ethics decisions. Several survey participants emphasized the value of having trainings for department members at all levels, including faculty. Here is a sampling of responses from early-career APS members:

> *"My institution has computer-based ethics-training courses we have [to] take once a year, so that's an option. . . . But it's also a pain and nobody really takes it seriously."*

> *"In my experience, young physicists don't want more meetings, but they love critically thinking to answer difficult questions. The most effective method I've encountered in a more formal setting is open-forum discussions of no more than six people in a group, being given appropriately complex ethical puzzles to discuss freely."*

> *"At some level, I believe mandatory training would be the most effective. From personal experiences, many people view ethics as a known quantity without the need for review or training. However, there are many details to ethics that this viewpoint doesn't account for."*

> *"Faculty, especially older generations, need ethics training—perhaps on a regular basis. This needs to be required on an institutional level. Either they were never trained in ethics, or they were but get caught up in politics or don't think ethics are important or don't think they are doing anything wrong. Students and the scientific enterprise suffer as a result. Students have plenty of ethics training, but we don't have the power to ensure that everything is carried out ethically."*

> *"Not sure: formalized classes and trainings are often viewed as a bother/nuisance, especially if the examples given are obvious. Presenting ethical dilemmas that are commonplace and relatable (and gray, rather than obviously unallowable conduct) may lead to more robust discussion about the range of appropriate responses."*

Training practices across departments differ. The departments granting only bachelors degrees are more likely to have mandated ethics training for all faculty, whereas departments granting PhDs are more likely to offer a semester-long ethics course. According to written comments by the department chairs, training can mean various things depending on the institution.

> *"We do have some visibility regarding harassment policies on-campus, which is more specific. We do have Diversity, Equity, and Inclusion training and initiatives for all employees, particularly related to campus climate studies. We do not have as many visible activities regarding ethics, [which] I take to be more general."*

> *"We take a hard-line approach on cheating, plagiarism, etc. and we try to model ethical behavior for students. We have [an] ethics course in [the] general curriculum. Our majors also complete specific ethics-related content (class discussions and HW) in our Advanced Lab course."*

"The training for students is understood and needed as part of the graduate school in particular. It is spottier for the undergraduates and the faculty and staff. The training should be formalized and improved."

Limited reporting

An unsettling picture of the reporting of ethics violations emerged when we compared the information from the department chair survey with that from the early-career survey. In response to the question "Have you ever observed or had personal knowledge of ethical violations during your time as a graduate student or as a postdoc?," some 288 (38%) early-career respondents who witnessed an ethics violation knew where to report it; the remaining 469 (62%) did not. They wrote 517 comments and described 527 cases of ethics violations. Respondents said that they themselves had provided institutional reports on 108 of the cases and that a total of 131 reports were filed, whether by themselves or someone else. Out of the 527 cases of ethics violations, 60 were resolved in a way that the respondent thought was satisfactory. Thus, according to the responses, roughly only 20% of ethics violations had institutional reports, and of those, only a bit more than half were resolved well in young physicists' eyes.

Figure 2 shows ethics-violations data from the department chair survey. The 622 chairs who responded—yielding a response rate of 81%—reported more than 600 reported violations in the past five years, although most chairs said that they knew of none. In comparison, only 25% of postdoc and graduate-student APS members responded to the society's early-career survey: Early-career APS members, who had obtained their PhD within the past five years, said that 131 violations were reported to authorities.

We are not sure how to reconcile the disparate findings, but one plausible scenario is that about 500 ethics violations may have been reported to authorities by early-career APS members if the response rate of 25% was extrapolated to 100%. That number of violations is not far below the 600 that chairs said they knew about. Department chairs may receive violation reports from others beyond graduate students and postdocs, so having early-career members report 500 estimated violations could be reasonable.

If the interpretation is correct, the majority of chairs lack effective communication channels for people to feel safe reporting ethical dilemmas they face or have witnessed. The majority of cases go unreported. The 66% of chairs in figure 2 who said that they dealt with no ethics violations in the past five years should be concerned by the possibility that cases occurred but were not reported. Here is a characteristic description of what students face:

"I did not report because I did not know the avenues to report and the person has significant influence in my career."

The perspectives from the chairs and early-career scientists on ethics education and the experience of ethics violations in physics departments reveal important disconnects. Many early-career respondents have specific views on what types of ethics-related education would be useful to them beyond what they obtain through research-group activities. The need for ethics education has not risen to the same level of urgency among department chairs. They may have an overly favorable view regarding ethical practices in their departments, which is understandable if students and postdocs do not report 80% of the infractions that they experience, observe, or have been told about. The lack of reporting is because of a fear of retaliation—for example, not getting a good letter of recommendation, not receiving a PhD in a timely fashion, or being given less recognition or help in research—and the concern that justice would

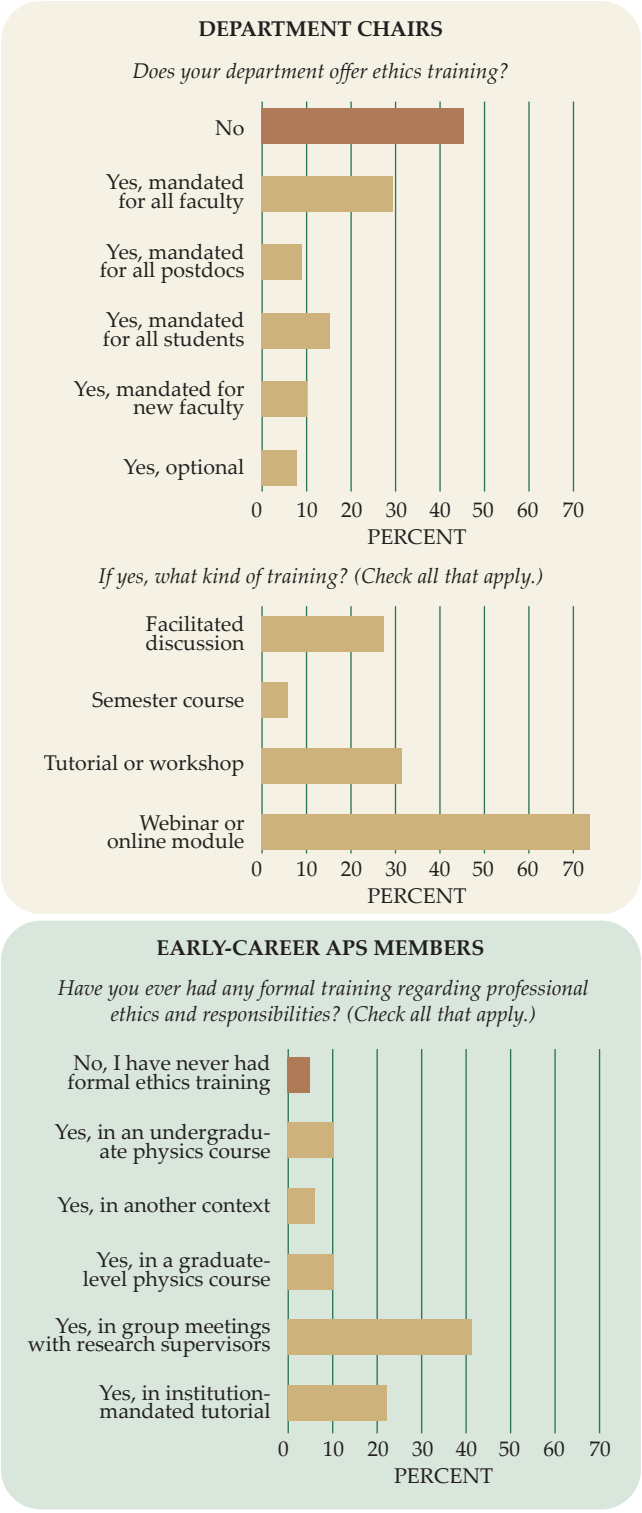

FIGURE 1. PHYSICS DEPARTMENT CHAIRS describe their ethics training compared with the training that early-career members of the American Physical Society say is offered. (Courtesy of APS.)

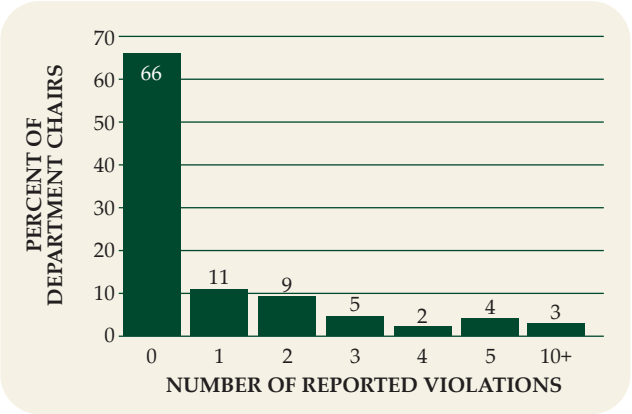

FIGURE 2. FEW REPORTED VIOLATIONS. When department chairs were asked, "How many reports of ethics violations have you dealt with over the past five years?," 9 out of 10 (91%) responded that they dealt with three or fewer. (Courtesy of the American Physical Society.)

not be served by reporting. According to one respondent:

> *"I did [report it] to my department first. I was warned by a female no less that even if I succeed in getting justice it never works out for the victim in the end. I was told I was better off graduating in good terms with everyone. I let my advisor know about it and while he 'said' he was supportive and gave me advice on who to talk to he never did anything to help me out nor ever asked about it ever again."*

We did not survey physics undergraduates, and filling that gap would produce a more complete perspective of physics departments. Five years ago, however, undergraduate women attending the APS Conferences for Undergraduate Women in Physics were surveyed regarding whether they had been sexually harassed in the context of their physics education. The results showed that a shocking 75% of them experienced sexual harassment, most of which was never formally reported.[2] The Federal Policy on Research Misconduct, put out by the Office of Science and Technology Policy in 2000, does not include sexual harassment as one of its unethical practices, which it defines as fabrication, falsification, and plagiarism. The American Geophysical Union, however, has elevated sexual harassment to the same level of misconduct as the federal policy,[3] and APS has included extensive material on harassment and bias in its 2019 ethics guidelines.[4] Mistreatment of people is now considered by almost all scientific institutions, universities, and national and industrial labs to be a serious ethical breach.

Many scientists argue that the lack of accountability in departments is problematic because it allows ethics infractions to be ignored, perpetrators to continue their harassment, and toxic environments to persist.[5] In the survey, department chairs say that they refer reports of harassment to higher administration officials or Title IX offices, which places the investigations outside the department. That approach, to a certain extent, may be required by the college or university, but it can absolve a department chair from taking responsibility for holding anyone accountable for infractions. It may appear to those lower down in the academic hierarchy as a way of passing the buck.

Elevating harassment cases to other offices also discourages people from reporting ethics violations: One early-career APS member warned that "nothing will happen to address them." In many institutions, the role of a department chair is temporary—often three to six years—and a chair might feel quite hesitant to bring one of their colleagues to account because of fears of retaliation. Although faculty members and department chairs are mandated to report sexual harassment, they are not required to inform authorities about research misconduct issues related to fabrication, falsification, and plagiarism.

How to improve ethical behavior

Most department chairs were quite positive that APS could contribute considerably to ethics education. They were interested in APS webinars, case studies, and other materials that could start educational conversations about ethics in physics. Chairs may be eager to engage their department on ethics topics, but they feel that they lack resources and know-how.

Webinars and online ethics-training modules, however, may not be effective. Survey results showed that 55% of responding NSF graduate research fellows in several science and engineering disciplines felt that "mandatory ethics training left them unprepared to deal with ethical issues."[6] Because ethics violations almost always involve humans acting badly and the circumstances are not always clearly right and wrong, how to apply ethics training can be confusing. Designing effective training, such as discussion-based seminars and examination of real-life cases that can be widely shared, will help build the capacity across physics departments to prepare students more effectively.

As outlined in the ethics section of APS's Effective Practices for Physics Programs guide, establishing a culture of ethical behavior with respect to teaching, learning, and research in a department is imperative.[1] The chapter includes detailed suggestions for getting buy-in from and raising the profile of ethics in the department. The early-career respondents emphasized the importance of good role models. For example:

> *"I think training facilitated and taught by senior physicists for junior physicists would be most effective. This would both teach valuable information and model/show younger physicists that their senior colleagues value and are receptive to ethical issues."*

In a hierarchical department, students may not feel comfortable talking to the chair about an infraction. It is often thought to be best practice to appoint a neutral party: someone who is well regarded, who may be from outside the department, and who can maintain confidentiality so that difficult issues can be explored and discussed. Some questions that may arise include the following: Did the person really commit a breach of ethics? Were they aware of the rules? Was the person exhibiting disrespectful behavior? Which options are available for dealing with the situation? Providing multiple lines of communication would also be valuable to accommodate diverse personalities and department structures.

Many institutions appoint an ombudsperson to serve as a neutral third party. In some cases the position provides a positive institutional contribution when problems arise. On the other hand, some worry that an ombudsperson has little power and therefore deflects problems. The respondents to our early-career survey provided some information on the two views. In the 517 comments described above on institutional responses to ethical failings, only two referenced an ombudsperson. In each of those cases, the respondent said that they were dissatisfied with the

institutional response. Because of a lack of mention, we cautiously conclude, therefore, that the ombudsperson is often not effective in addressing ethics violations.

Is there any common thread binding together the 60 ethical problems that early-career APS members thought were resolved well? We have only 15 comments that provide more detail beyond that the matter was reported and resolved. In 12 of them, a group leader or PhD adviser led the resolution; in three, it was journal editors. A critical element for improving institutional response, therefore, may be the establishment of a trust network between and among students, faculty, postdocs, research advisers, and the department chair. Without trust, ethical concerns will not be reported. Developing trust demands open lines of communication and an institutional willingness to address problems.

Taken together, the results of the department chair and early-career surveys show an evolution of ethics awareness over the past two decades. Ethics education has improved: 95% of early-career respondents say they had some kind of ethics training—mostly in research groups or through institutionally mandated, and usually Web-based, tutorials. Many of the early-career comments, however, show that Web-based training is not valuable and does not equip the learners with the necessary tools to deal with real-life ethical issues. Physics departments should give more attention to ensuring that faculty, staff, and students have a clear and complete understanding of ethical principles, should consider other methods of teaching about ethics issues beyond Web-based modules, and should provide safe ways for people to raise concerns. Chairs listed positive actions that APS could take to help them build an ethical department culture. Most importantly, it is clear that dialog and open communication are essential to enabling everyone in the physics profession to continue to improve ethical behavior.

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