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Ethics in 15-minutes per Week

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Abstract

The demand for science trainees to have appropriate responsible conduct of research instruction continues to increase the attention shown by federal agencies and graduate school programs to the development of effective ethics curriculums. However, it is important to consider that the main learning environment for science graduate students and post-doctoral research fellows is within a laboratory setting. Here we discuss an internal laboratory program of weekly 15-minute ethics discussions implemented and used over the last three years in addition to the graduate school's program of scientific integrity training. During this time, the environment and culture within our laboratory has changed to place greater emphasis on the ethical implications of our own research and the research we evaluate. We still struggle with how to accurately assess this behavioral change; although, we present preliminary survey results on the evaluation and impact of this style of curriculum for ethics instruction in our laboratory.

Keywords

Responsible Conduct of Research; Bioethics Curriculum; Scientific Integrity; Laboratory Ethics Curriculum; Group Mentoring

With the passing of the America Competes Act in December 2007, the National Science Foundation (NSF) now requires all trainees supported on NSF awards to receive Responsible Conduct of Research (RCR) instruction. Along with similar requirements by the National Institute of Health (NIH), the large majority of graduate students in the United States academic system are now required to receive RCR education. Also included in this trainee category are post-doctoral research fellows and junior faculty members supported by NIH-funded training grants. As Dr. Steneck described at a recent RCR Education, Instruction, and Training conference, the current state of RCR affairs is a compliance driven culture (Steneck 2008). In our view of a compliance driven culture, the driving force is not necessarily what should or should not be done for the ethical integrity of the science, but

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what can or can not be done within the confines of the institutional norms and regulations. Within this type of culture, auditors and review boards are seen more as adversaries, looking to get people in trouble or impede the advancement of science, rather than assistors to performing accurate and ethical science. Researchers become wary of reporting innocent violations of protocol for fear that accusations of misconduct will lead to lost jobs and scandalous headlines.

In agreement with a compliance culture, we see the primary goal of required RCR instruction as being the reduction in the amount of falsification, fabrication and plagiarism (FFP) committed by scientists. Acts of FFP can cause a researcher to be sanctioned by grant agencies, denied eligibility for federal grant support, and potentially prosecuted in the criminal courts. Typical FFP-centered RCR instruction lets you know where the punishable line is located and teaches the “do's and don'ts,” but it does not necessarily address the “should's and ought's” of the scientific enterprise. Violations of the scientific enterprise other than FFP are called questionable research practices (QRP), which are incidents such as maintaining inadequate research records to allow for replication of experiments, that are seen as undesirable but not prosecutable. What makes these QRP's important is that an individual who performs a specific QRP is 2 to 11 times more likely to also perform FFP (Anderson, Martinson et al. 2008). Research on FFP and QRP suggests that early career scientists are much more likely to commit violations due to the combination of ignorance and a competitive environment (Martinson, Anderson et al. 2005; Anderson, Ronning et al. 2007).

Heavy debate and research is currently being pursued on the best practice for teaching RCR to trainees as federally required (e.g., Anderson, Horn et al. 2007; Heitman, Olsen et al. 2007). The majority of this call to arms has been and is being levied at institutions' graduate programs. Primary investigators (PI) are encouraged to actively participate in generating and teaching courses in RCR with their institution's office of research and/or graduate school. Trainees are encouraged to attend instruction typically outside of the laboratory environment in addition to traditional research duties. Most of these courses, however, have poor participant reviews, suffer from a lack of general interest in the material, and are seen by many as an unnecessary lecture in the “obvious no-no's of research.” Further, when programs are viewed as beneficial, trainee's grumble that their ‘non-compliant’ PI or senior laboratory member should also take instruction in proper conduct; although, this is infrequently required. A PI's laboratory behavior is seen as ‘the hidden curriculum’ of science and the PI, along with senior laboratory staff, represent the professional role models that trainees see on a daily basis, whether good or bad (Fryer-Edwards 2002; see also item 1 in Table 1).

It is hard to imagine consensus across the laboratory hierarchy on a method for teaching ethical and scientific integrity that would promote a supportive rather than authoritarian culture. We would like to present our perspective on the federal requirements for RCR training of trainees, which utilizes 15-minute discussions within the laboratory on a weekly basis, to engage laboratory members beyond institutional RCR programs. This program is a unique curriculum, in that it was designed by and implemented across all stages of the laboratory hierarchy. In fact, it began after trainees brought the idea to their mentor for implementation. While similar to programs of Group Mentoring (Whitbeck, 2001), it expands the discussion from trainee and supervisor to include those within the entire laboratory – research associates, graduate students, rotating students, visitors, post-doctoral fellows, and faculty. In one typical year, these discussions provide 11-12 hours of RCR and scientific integrity training. This is beyond the training provided by the institution and represents a commitment of the laboratory to providing RCR training to all laboratory members. As with most institutions the scientific integrity and RCR training is directed at

new graduate students, and at our institution it also involves roughly 10% of the institution's postdoctoral fellows and 5% of faculty members per year.

Additionally, we present results of a survey given to individuals who had the opportunity to attend these discussions. This survey was distributed under Institutional Review Board approval and respondents were able to drop surveys into campus mail to ensure anonymity. Of 26 potential candidates, 24 were reached to participate in the survey. These 24 individuals included 16 current laboratory members and represented individuals that had been on the journal club mailing list for 6 months – 3 years (mean 1.73 years; mode 2 years). Seventeen surveys were returned including the three authors of this article. The responses for the author responsible for designing and distributing the survey are dropped. We feel it is important to include the other author's responses on questions of course impact (Table 1) because the authors participate both in the culture of the laboratory and the 15-minute discussions. Data from all authors were excluded when discussing the effectiveness and enjoyment of the course (Table 2) due to the conflict of interest. Respondents include 8 faculty members, 3 fellows, 4 graduate students and 3 research staff. This is acknowledged to be a small sample, and the data here needs to be replicated using a larger program with more laboratories participating to assess whether this program has strong curricular merit or simply results from the group of participants.

Our program has been implemented over the last 3 years and is delivered following the weekly laboratory journal club. Journal club and the ethics discussion are attended by most members of the laboratory with attendance ranging from 8-20 members (on average 12). Although it is not mandatory to stay for ethics, few people skip out, with only 12.5% of survey respondents occasionally leaving early due to scheduling conflicts. Similar to the rotation of assignments for leading the discussion on a research article for journal club, individuals are assigned the task of selecting a publication for ethical review by the group prior to our meeting, and we discuss the article and its implications during our time together. No one has begrudged the task of selecting the week's topic (see item 2 Table 1), a task that rotates through everyone in the laboratory and includes discussion moderator duties. When compared to the other forms of ethics education that survey respondents had participated in over the same period, the 15-minute discussions rated highest in both effectiveness and enjoyment (see Table 2).

When the discussions first started, it was a much more formal exercise where cases were selected from a 6 volume series produced from workshops on Graduate Research Ethics Education at Indiana University, Bloomington (1997-2002) and edited by Brian Schrag. A case was selected and the proposed discussion questions were addressed in the group as a whole, while the commentary was summarized by the person who selected the case. We began implementing methods described by Muriel Bebeau in an article entitled *"Developing a well-reasoned response to moral problems in science"* (http://poynter.indiana.edu/mr/mrdeveloping.pdf) to work through presented ethical dilemmas. Briefly Bebeau suggests developing your ethical reasoning strategy by first identifying the problem or issue at hand, naming the stakeholders in the predicament and any role obligations that party has, and finally brainstorming potential solutions and their likely consequences.

An additional source of discussion was the newsletters released by the Office of Research Integrity (ORI) on case summaries of misconduct rulings. These provided information on researchers actual FFP infractions and ORI punishments. From these reports, we would perform internet searches for the named articles and discuss the articles impact, or in the rare occasion when we could obtain a copy, we would look to see if we could find any indication as a peer reviewer that the information was false. In addition, it was sometimes necessary to pull up institutional protocols to address the question, "How does that (e.g. reimbursement

for consultation) work here?" As we became more familiar with discussing cases and findings of misconduct, our confidence increased (see item 3 Table 1), and we became more willing to consider the ethical implications of our own research and lab policies along with these generic scenarios (see items 4-5 Table 1). This enriched the discussions that we had in each 15-minute session, and often the policies for best practices within the laboratory or for reporting data were discussed. In addition, it became a time to air concerns over non-written policies within the laboratory (e.g., the way in which data was being collected or stored) or to discuss practical how-to's on avoiding situations that frequently underlie irresponsible conduct (e.g., causal factors as described by Davis et al., 2007). Discussions frequently included a variety of viewpoints, something that is enriched by having different levels of laboratory people in attendance (see items 6-8 Table 1) as well as a diversity of cultures. However, it is important that someone is always designated in the discussion to facilitate so that the group discussion involves all parties, moves through the moral-reasoning strategies and comes to a resolution or take home message. As self-assurance grew, the ethical and RCR discussions began to occur outside of the appointed discussion time and now occur frequently within the laboratory (see item 5 Table 1), especially during the design of new study protocols. In addition, the majority of the laboratory was regularly participating in these discussions, and these were the individuals discussing the ethical implications outside of the 15-minute discussion time. It is of note that the largest difference between faculty and non-faculty on the survey considers whether or not the individual yields to the view point of the ethical authority regardless of the solution posed (item 8 Table 1). Non-faculty members within the laboratory disagree more strongly than faculty members on this point which indicates a high-level of independence within non-faculty members.

One of the often cited best things about the ethics discussion is the variety of pertinent topics discussed, and looking over the most recent topics discussed, we have covered all of the RCR categories described in Dr. Steneck's ORI report (Steneck 2004), the social implications of eugenics and gene therapy (Fox 2002), implications of drug advertising (Saul 2008), peer review process (Grimm 2005), and the definition of what is natural (2008). Many of these topics are raised in popular scientific journal publications such as *Science* and *Nature* or come from the *New York Times*. These publication sources are readily available to society both in and outside of the scientific community and represent topics that are being discussed among scientists, policy makers, and tax payers. Additionally, an invaluable collection of resources and knowledge that can be used to foster discussion within a laboratory group is provided by each institution's office of research, government websites (e.g., ORI Education http://ori.dhhs.gov/education/rcr_resources.shtml ; NIH Bioethics resources http://bioethics.od.nih.gov/researchethics.html), National Postdoctoral Association RCR toolkit (http://www.nationalpostdoc.org/rcr-toolkit), and online ethics communities (e.g., NCSU http://gsoars.acsad.ncsu.edu:85/ ; RCR Education Consortium http://rcrec.org/). The wide range of topics, broader ethical context of research and the inclusion of popular press articles are cited in the survey as some of the best things about the ethics discussion; however, with such broad concepts, it can be difficult to relate them to day-to-day research behavior and a specific effort should be made to help foster the connection, if applicable (see item 9 Table 1). It is important for the professional development of trainees to begin to monitor the ethical discussions being considered by policy makers as well as the scientists in their respective fields. These discussions are what shape the future of the field.

As the focus of funding agencies begins to move from the production of RCR materials to the evaluation of effective training, an important research question is determining whether RCR courses actually affect the daily lives of researchers in the laboratory. Do they have the potential to reduce FFP and QRP? We propose moving a component of the ethical discussion into the laboratory environment and empowering individual scientists at all seniority levels to actively participate in expanding their own awareness of RCR issues

facing research and science policy. By promoting RCR as a core value in the laboratory, the culture of the laboratory changes (see item 5, 10-14 Table 1). Traditional graduate training seeks to develop an automatic response in trainees to ask about the practice of science (e.g., what is a good control for an experiment or the hypothesis that you are attempting to test with this experiment). Using these 15-minute discussions, we have been successful at developing moral and ethical questioning as an automatic response for trainees in our laboratory. Not only do all respondents agree that they now consider the ethical implication of other research when listening to lectures or attending conferences outside the laboratory (see item 15 Table 1), but also trainees and staff agree that they freely can report protocol violations and mistakes to their superior (see item 16 Table 1). It is interesting to note that when faculty responses are added the median decreases to neither agree or disagree. This may indicate the importance of having one's supervisor included in frequent ethical discussions as an equal member and not the sole authority; although the relationship between trainee and mentor is different from between faculty and chair. As summarized by a respondent when asked about the importance of the program, “[sic] Great approach for keeping good clinical practices in the front - not the back- of your mind.” The program moves laboratory members to what Whitbeck (2001) calls “attention to prospective responsibility,” developing a course of action and evaluating it while moving forward instead of retrospectively assessing blame or praise.

A continuing question remains as to how to objectively measure the behaviors ethics training is seeking to affect. Is it enough that as people transition out of the laboratory they take the idea of the 15-minute ethics discussion with them and would implement it in their new laboratory (see item 14 Table 1)? Or that the program continues along with a new journal club ran by a different faculty member? Or when we design a new protocol, we not only consider the current regulations and guidelines but also what we ought to do or not do (see item 13 Table 1)? Or is it the fact that as trainees we are comfortable in reporting protocol or procedure violations to our PI, so that issues can be addressed as they occur? Regardless, our 15-minute program provides a unique take on the RCR requirement in the scientific community that unites scientists across different career levels within a laboratory to discuss professional development in RCR and best practices. As summarized by a survey respondent (altered to protect anonymity),

> “I've trained at many places in my life … and in many environments … and ethics training is, quite frankly, usually nonexistent. Oh yes, there are computer programs to run, mandatory seminars to attend …, but these are not taken seriously. Yes, they are taken seriously at the time, but they do not get translated into the laboratory. I have never heard any ethical discussions from any medical doctor or PhD researcher outside our laboratory when discussing patient, studies, or their research. Rather, ethical discussions are simply for intellectual discussions. The lab is unique in that we are always worried about performing ethical research and ethics are always considered. This is probably because there is a weekly discussion of ethics. I know that, personally, I never really thought much about ethics, assuming that I was an ethical sort of guy, but the “lab environment” has often made me rethink my research policies.”

In promoting this method, it is not our intent to subtract from institutional RCR responsibilities, but to address the need of within laboratory discussions on RCR. These internal discussions allow all members of the laboratory to be engaged in the process of doing research with integrity. They promote a more open discussion of institutional rules (i.e., compliance), best practices, and professional responsibility. However, instead of a limited discourse on compliance of the rules and regulations, these discussions allow for working through the practice of doing science with integrity on a day-to-day basis within the laboratory environment. Since best practices are discussed with all members of the scientific

team, it ensures that everyone is on the same RCR page. It also forces all members to formulate their thoughts concerning RCR and to discuss differences in an open manner. As it has done in our laboratory, we hope these discussions spark a grass-roots RCR movement that changes the scientist's attitude and openness to participate in RCR instruction and discourse.

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Please find enclosed our revised manuscript entitled “Ethics in 15-minutes per week.”First, we appreciate the reviewer's constructive commentary on our “Ethics in 15-minutes”article. We would like to resubmit a revised version incorporating many of your suggestions and entitled “Ethics in 15-minutes per week.”

In summary, major alterations were made to ensure more concise interpretation of our program and logic in presenting it in this manuscript. Briefly, our program is done in addition to our institution's graduate school curriculum and is a means to advancing the culture of the laboratory. We acknowledge the small sample size and lack of a control group more directly in the methods description. Overall, statements were rained in as directed by Reviewer #3 and 4 to more accurately represent the conclusions from the available data. Further information on the ‘how-to’ of our discussions was added as requested by Reviewer #2 and 4 as well as references on how this instructional method fits into the current schema of RCR training. Greater descriptions of the population asked to participate in the survey and from whom responses were collected is given as requested by Reviewer#4 and 5. Data tables were modified as suggested by Reviewer #1 to be clearer and represent the pertinent data concisely.

These modifications strengthen the article and we submit it for reconsideration in its current form. Please let me know if you would like further revision to this manuscript for publication in Science and Engineering Ethics.

Sincerely Yours,

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Table 1
Average Response for the survey on the 15-Minute Weekly Ethics Discussion

(Rated: 1: Strongly Disagree, 2: Disagree, 3: Neither Agree nor Disagree, 4: Agree, or 5: Strongly Agree with the statement) Question order is presented as discussed in the article, and data includes responses from the two authors not involved in designing or administering the survey. The Standard Error of the Mean is found within the parentheses.

Questions	All Responses (n=16)	Faculty (n=7)	Non-Faculty (n=9)	ΔFaculty – Non-Faculty
1. The primary investigator on my project is the person I look to for defining appropriate and ethical research conduct.	3.63 (0.24)	3.43 (0.30)	3.78 (0.36)	− 0.35
2. I don't mind selecting a topic for the ethics discussion.	4.06 (0.23)	4.14 (0.34)	4.00 (0.33)	0.14
3. Due to our ethics discussions, I am more confident in discussing ethical situations in research.	4.13 (0.18)	4.00 (0.22)	4.22 (0.28)	− 0.22
4. Due to our ethics discussions, I can identify potential ethical conflicts in my own research.	4.38 (0.18)	4.14 (0.34)	4.56 (0.18)	− 0.42
5. The more we discuss proper conduct within the laboratory, the freer I am to ask questions concerning appropriate procedures and conduct when performing research.	4.13 (0.15)	4.00 (0.31)	4.22 (0.15)	− 0.22
6. During ethics discussions I feel free to raise any view point even if it is not the 'politically correct' view point.	4.50 (0.20)	4.43 (0.43)	4.56 (0.18)	− 0.13
7. I feel free to disagree with faculty members on the correct solution to an ethical situation.	4.63 (0.13)	4.71 (0.18)	4.56 (0.18)	0.15
8. I yield to the viewpoint of the ethical authority regardless of the solution posed.	2.06 (0.28)	2.43 (0.57)	1.78 (0.22)	0.65
9. I regularly compare my day-to-day research behavior to the scenarios covered in ethics discussions.	3.38 (0.24)	3.57 (0.37)	3.22 (0.32)	0.35
10. I am able to question the behavior of others in the laboratory in regard to responsible conduct of research.	3.69 (0.22)	3.71 (0.47)	3.67 (0.17)	0.04
11. I am more aware of ethical debates concerning science and the application of research findings because of my involvement in the ethics discussions following journal club.	4.50 (0.18)	4.71 (0.18)	4.33 (0.29)	0.38
12. My development as a researcher with scientific integrity is supported in this environment.	4.56 (0.13)	4.43 (0.20)	4.67 (0.17)	− 0.24
13. Compared to other laboratories, our laboratory more freely discusses the ethical implications of the research design and findings.	4.44 (0.16)	4.43 (0.20)	4.44 (0.24)	− 0.01
14. I think that this type of ethics discussion should be required in all research laboratories at the institution.	3.88 (0.22)	4.14 (0.26)	3.67 (0.30)	0.47
15. I consider the ethical implications of other research when listening to lectures or attending conferences outside of the laboratory.	4.00 (0.18)	3.71 (0.29)	4.22 (0.22)	− 0.51
16. Due to our ethics discussions, I feel free to report protocol violations and mistakes to my superior.	3.75 (0.25)	3.43 (0.30)	4.00 (0.37)	− 0.57

Questions	All Responses (n=16)	Faculty (n=7)	Non-Faculty (n=9)	ΔFaculty – Non-Faculty
17. I plan to continue this style of ethics discussion; if/when I operate my own research laboratory.	4.13 (0.22)	3.86 (0.40)	4.33 (0.24)	− 0.47

Table 2

Effectiveness and amount of enjoyment from different ethics education pedagogies

in which non-author respondents had participated over the past 3 years. (Rated: 1: Not helpful/ineffective; Boring/terrible experience; 3:Somewhat helpful/effective; Alright experience; 5:Very helpful/effective; Very enjoyable experience) The Standard Error of the Mean is found within the parentheses.

% of Non-Author Respondents Participating	Program Type	Effectiveness	Enjoyment
24	Half-day Workshop	3.50 (0.50)	3.00 (0.00)
29	Professional Conference Seminar	3.67 (0.67)	3.00 (1.15)
35	Problem Based Learning Small Groups	3.40 (0.24)	3.60 (0.24)
41	Lecture	3.20 (0.37)	2.00 (0.44)
71	Readings	3.67 (0.24)	3.44 (0.29)
76	Computer Course	2.70 (0.42)	1.70 (0.40)
100	15 Minute Ethics Discussion	4.08 (0.24)	4.62 (0.14)