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Student Voices

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On creating a fertile academic atmosphere in fisheries and wildlife schools

One of the most important roles of academic departments is to help new professionals develop into thinkers and life-long learners. Beyond specialized training in wildlife and fisheries science, there is a need to create an intellectual character in individuals and a collaborative character as a department. You may feel that "teaching someone to think" is an intangible concept. However, we believe that it is the inevitable consequence of immersing students in a vibrant academic community. Conversations with peers and our own experience at a variety of academic institutions have led us to believe that there are numerous ways for professors and students, both graduate and undergraduate, to work together to create a fertile professional academic atmosphere. Faculty stand to gain much from these productive relationships, including generation of new ideas, improved productivity of students, and increased recognition within their profession when well-rounded graduates move on to other universities and professional agencies.

Here we discuss practices that we feel are key to developing an effective educational community within fisheries and wildlife schools but that are not always recognized or encouraged by educational institutions. Many others, such as teaching, are obvious and typically receive due attention, so we do not address them here. Our concerns can be condensed into 3 general topics: effective communication among students and faculty, developing professional skills in students, and effective approaches to scientific research. All the schools we have attended have performed well in many of these areas but could likely improve in others. Indeed, many of these attributes are more appropriately considered at the level of individual faculty and students, not departments as a whole, and different individuals achieve different levels of success in addressing them. We hope that by discussing these issues here they will be more likely to be consciously considered by educators and students in our profession.

Effective communication

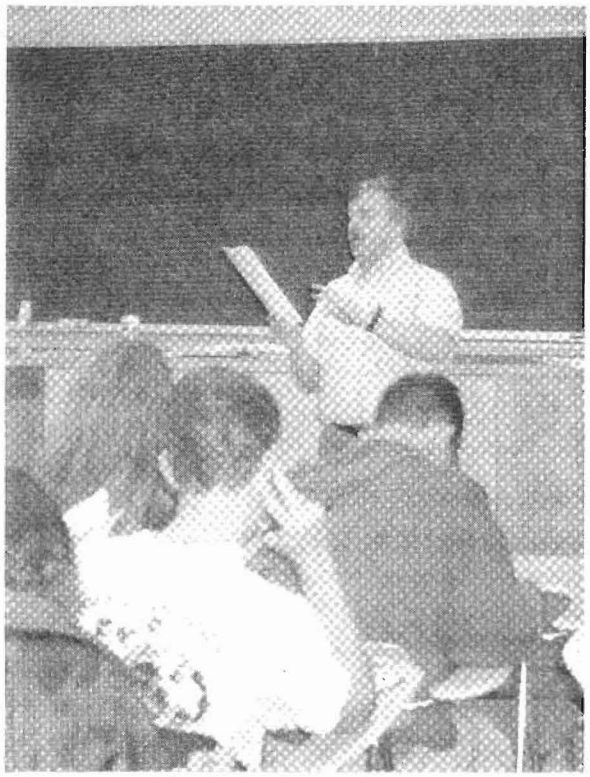
The cumulative intellectual strength of an academic department can be far greater than the sum total of the individual intellects of faculty and students. The full strength of collaboration is best realized through good, constructive communication within the department. We feel that students and faculty who wish to initiate better communication must understand that this is a 2-way street, where students and faculty must be ready to create an environment in which these interactions are more likely to happen. We have developed a descriptive framework that we feel is helpful in clarifying the various levels of professional communication between academics. In this, we see academic communication as a process occurring at 3 basic levels: first order-purely professional interactions; second order-informal professional interactions; and third order-informal conversation. Each plays an important role in developing student minds and is in some way essential for nurturing a vibrant academic climate. Consequently, facilitating communication at all 3 levels is critical in a department that is dedicated to helping students develop into effective thinkers.

First-order communication refers to formal interactions in which a specific topic of discussion is determined *a priori* and is addressed formally. Typically these interactions involve some form of hierarchy, where subordinates receive wisdom or guidance from individuals in positions of authority. Examples include classroom lectures, graduate-student committee meetings, office visits with

professors, graduate-student teaching assistants working with undergraduates, graduate oral examinations, and thesis-dissertation defenses. This form of communication is rarely lacking in any university department. These interactions help to create professionalism, accountability, and mentorship in a department and tend to be well organized and concise. Students need to participate regularly in these interactions to ensure progress through their academic program. However, students often find professors and graduate teaching assistants intimidating or unapproachable under these circumstances. These types of interactions rarely lead to free, unencumbered conversations or brainstorms; typically fail to deal with many of the day-to-day aspects of professional work; and likely do not contribute greatly toward building a sense of self-esteem or empowerment in the student (i.e., subordinate). If communication is generally restricted to this level, students will learn little about the professional and social character of their mentors and are less likely to develop into free-thinking, critical-minded professionals.

Second-order communication refers to more informal professional interactions. They have a tendency to be low-stress, nonhierarchical interactions that can occur in, for example, brown-bag seminars, departmental parties, pub hours after work, and lunchrooms or coffee rooms. Though the hierarchical relationship between students and faculty still exists in these situations, it is relaxed (i.e., individuals act as peers or colleagues), allowing a free and enthusiastic exchange of ideas. Graduate students often find these interactions very gratifying and empowering because the professor involved is conveying an attitude of respect by expressing interest in the student's ideas and thoughts. This brings the student closer to a peer level with their professor.

We feel that individuals and departments are often weak in this area, in part because the importance of informal interaction is not recognized or it may be viewed as unprofessional or unproductive. Some faculty may feel they risk losing their authority or respect from students by participating in this level of friendly communication. However, we have found that students almost invariably feel a much greater sense of respect for professors they find approachable, if for no other reason than that they know them better and sense some level of mutual regard. Discussing professional matters outside the usual structured academic environment assists in



First-order interaction. Dean Stauffer passes years of knowledge on to students enrolled in his wildlife habitat analysis course.

mentorship by helping students learn the professional character of their superiors. Students can identify faculty resources they may otherwise overlook and develop new ideas for their work and research. Second-order interactions are an opportunity to discuss major trends in our field outside our restricted specialization. Also, these conversations can help faculty develop their own ideas, tune in to student concerns, identify with individual students in their department, and view students as a resource for ideas and information. This paper is a perfect example of the catalytic and fertile nature of informal professional conversations; it was conceived during a Friday-afternoon pub hour during which we discussed graduate student education with a senior professor.

We have suggested that some departments could do better at creating this sort of collegial environment with its associated advantages while still maintaining professionalism. We offer the following as examples of situations that facilitate productive second-order communication: 1) brown-bag seminars, 2) birthday parties for prominent historical figures in our fields (e.g., Leopold, Darwin,

Carson, Jordan), 3) quiz bowls, 4) faculty participation in student chapters of professional societies, 5) collaboration in field work, and 6) a good common room with a neutral atmosphere for eating lunch, making coffee, and having informal meetings. We believe that a high level of second-order communication is absolutely essential in maintaining the intellectual fertility of a department and offers immense academic benefits to students and faculty.

The final level of interaction we present is third-order communication, which refers simply to friendly conversations (e.g., "How is your spouse-dog-child-garden?). These interactions have no direct professional relevance and tend to occur at invited dinners, after meetings, or at departmental socials. Their advantage is that they humanize the teacher and student. We are more likely to understand the foibles and difficult circumstances of students and faculty if we are open with them and understand their personal character. Most faculty and students do not and should not feel obligated to participate in these types of interactions; however, we feel that they make the work environment more personal and can increase the comfort and productivity of faculty and students.

Professional development

Progress as a professional in our field does not only involve developing research skills. Students also must gain experience in teaching, mentorship, formal presentation and communication, outreach, and advocacy. These types of professional training continue throughout our careers as trends, technology, and standards in our field evolve. It is important that students be encouraged early to devote time to gain experience with aspects of professional development outside their immediate specialization. Some areas students and mentors should consider when evaluating professional progress in fisheries and wildlife sciences include: 1) student leadership and administration; 2) mentorship; 3) teaching skills, including interacting with students, giving good lectures, and giving good tests; 4) philosophy, methods, and ethics in science; 5) presenting seminars and posters; 6) field photography; 7) writing grant proposals; 8) scientific writing; 9) knowledge of the publication and peer review process; 10) ability to conduct an effective manuscript review; 11) time management; 12) constructing their *curriculum vitae* or resume; and 13) job interview skills.

Second- and third-order interaction. Associate professor Paul Angermeier (right) and several graduate students work on an experimental field study investigating patterns of fish dispersal in Appalachian streams.

The best way for students to achieve experience and training in these areas of professional development is to get out there and participate! We strongly encourage them to become leaders of student organizations, participate in sections or chapters in The Wildlife Society or the American Fisheries Society, organize seminars or workshops on various aspects of professional development, review other students' writing, and work as teaching assistants. Faculty participation in and support of these activities will almost invariably increase the benefits realized by students. Students should draw on the expertise of numerous professionals and faculty within their department. An academic advisor may be a student's primary research mentor, but students also should have strong relationships with other members of the faculty for other aspects of their professional development. Finally, senior graduate students should be encouraged to view mentoring junior students as a responsibility and an important part of their own education.

Approach to graduate research

Finally, we feel that many departments could improve their approach to graduate research by placing greater emphasis on graduate-student publication. We feel that the scientific process leading to publication provides an excellent framework for graduate research projects, but that few graduate students are actively encouraged to publish while they are still in school. This is an awkward topic. Most professors, if asked, will tell you that they encourage their student to publish. However,

telling students that they should consider publishing their research (or, should we say, not discouraging students from publishing) is not the same as proactively helping them get out those first few key papers. That first publication is a daunting prospect for many students, and they will likely need a great deal of guidance throughout the process.

The following is an approach to graduate research that we have found to be very productive. Put simply, we design our graduate research programs as a series of related publications that will be combined to form a thesis or dissertation at graduation time, rather than a thesis-dissertation that will be broken into a series of publications after graduation. In a sense, we are suggesting that the student's thesis or dissertation be viewed as a byproduct of their research program and education, rather than the ultimate goal and endpoint. This approach carries more benefits than simply increasing the likelihood that students will publish their graduate research. It helps them learn how to think like scientists while they are still immersed in an academic research environment. Our approach is easily incorporated into a student's research proposal. The proposal should present a series of research objectives, which individually or in combination form the bases for journal manuscripts. This process is then completed during preparation of research findings; students write and submit the papers as part of the process of writing up their work. Finally, the manuscripts are combined and reformatted as a thesis or dissertation, with details not relevant to a broader journal audience being added. Contrary to what many might expect, this final step should require little time and energy.

The benefits of this approach are numerous. First, students are more likely to graduate as published scientists, which greatly improves their chances of gaining employment or being offered a position as a doctoral student or post-doctoral researcher. This, in turn, helps raise the profile of professors and the department as a whole. Second, the research presented in the thesis or dissertation will have been prepared for (and likely undergone) anonymous peer review, thereby increasing the quality of the final product. Third, writing while in graduate school ensures that students can devote most of their time and energy to manuscript preparation, rather than just weekends and evenings after graduation. Fourth, numerous colleagues (particularly the advisor and graduate committee) will be close at hand during manuscript preparation and revision to provide advice and editorial assistance. Fifth, this approach introduces students to the peer-review process while in school and ensures that they graduate with a high level of skill in scientific writing. Finally, this approach dramatically accelerates the publication process and increases the likelihood that findings will be published. Society benefits because important and expensive graduate research, which in many cases may otherwise go unpublished, will reach a large professional audience.

We realize that some professors and students may feel uncomfortable with this approach. The most common reason we have heard for this is that they feel that a thesis or dissertation is more than simply a compilation of journal manuscripts. We agree, but are confident that the numerous benefits of our approach far outweigh the small amount of added time and effort required to include minor details such as expanded study-area descriptions, notes and conclusions of local relevance, and descriptions of unfruitful research initiatives. The addition of comprehensive introductory and concluding chapters ties the work into a cohesive document. Others may contend that not all graduate research is publishable. This may be true in a minority of cases; however, we feel that students are far more likely to conduct research worthy of publication if publication is considered an objective, not an afterthought. Finally, some people believe that it is inappropriate to publish graduate research that has not yet passed defense. We know of no reason for this other than tradition. If manuscripts are given to committee members for review before submission, the student is afforded an added opportunity for input and involvement and will be better prepared for committees' questions and concerns during the defense.

Summary

We hope that we have not given the impression that we advocate an unprofessional relationship between students or faculty, lack of concentration on research objectives, or incomplete, unfocused dissertations. We believe that a productive working environment in an academic community can best be brought about by good communication at a variety of levels, by thorough professional training, and by encouraging publication of student research. Many departments have mixed success in these

aspects of the development of their students. We hope that in discussing these issues we have helped to raise the consciousness of students and faculty. Finally, none of our recommendations are directed entirely toward either faculty or students. Both need to work together to create this environment.

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