

Helping Students Get Into Graduate School

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The process of selecting and gaining admission to a graduate program can seem daunting to undergraduates. They may not understand what steps are involved or even what factors they should consider. In this article, we outline the major issues involved in applying, visiting, and choosing among institutions. Moreover, if a student's

potential is higher than their current grade point average might suggest to an admissions committee, we provide some suggestions they can use to improve their application.

Key words: graduate school; education; training

IS GRADUATE SCHOOL THE RIGHT CHOICE?

When students approach us for advice on getting into graduate school, we often ask them what their reasons are for wanting to get an advanced degree. Some students are fascinated by a subject and want to learn all that they can about it. Others enjoy solving puzzles and like the excitement of discovering new things. And sometimes their motivation is that they want to work in an area in which career opportunities are limited (or non-existent) if they do not have an advanced degree. There are many good reasons for wanting to go to graduate school. However, students need to understand that graduating from college is in and of itself *not* a good reason to go to graduate school, and certainly not enough of a reason to go there directly.

If they have not already done so, we recommend that students think about where they want to be in 5-10 years, then ask people who are in those sorts of positions whether graduate training is needed. We also encourage students to try to sample some of what graduate school will entail. Talking to professors and graduate students, taking a graduate course or even just sitting in on a couple of lectures, and/or spending some time doing research can be very instructive. In these ways they should quickly discover that graduate school can be very different from the typical college experience.

Whereas the standard college experience in the United States tends to be fairly broad and not particularly practical, graduate school can be likened to an apprenticeship during which students focus primarily on acquiring the skills necessary to become an independent professional. Some of those skills may be purely technical (like a laboratory method), some are intellectual (like critically analyzing a journal article), and some are new ways of thinking. As Indira Nair, a Professor of Engineering and Public Policy of Carnegie Mellon University, once commented to us, in graduate school you move from being a *consumer* of knowledge to becoming a *creator* of knowledge. Grades are not very important (as long as one's work is satisfactory). And schedules are no longer defined by classes or even the school calendar; like their research advisors, graduate students work year-round.

If a student determines that graduate school is the right choice for them, the next question for them is whether this the right *time*. Many individuals wait until they have had

some post-college experience working in the area in which they wish to specialize before they move on to graduate school. In fact, some graduate programs prefer students who have worked a bit between college and graduate school. This is especially so if the work the student does between college and graduate school is relevant to their proposed graduate and/or long-term career goals. It provides the admissions committee with some assurance that the applicant "knows what they are getting into," and it reduces the chances that the individual will drop out of graduate school because of false impressions.

There are a number of ways that individuals can get research experience while they are undergraduates. There may be research opportunities on the student's campus. Moreover, on the national level there are a number of summer programs that are designed to promote undergraduate involvement in research (e.g., see the National Institutes of Health's Summer Internship Program and the list of internship and research opportunities that has been compiled by the Faculty for Undergraduate Neuroscience).

CHOOSING A GRADUATE PROGRAM

Once a student (or former student) has determined that graduate school is now the right choice for them, then it is time for that student to start exploring their options. Faculty working within the student's field of interest are a good source of information. Individuals need not feel shy about calling a professor they do not know to ask about information on about graduate school and careers in the field. Most faculty are more than willing to provide enthusiastic individuals with information and career advice.

There are a number of variables for students to consider when choosing a graduate program (Appendix 1). Most programs have a website that provides a considerable amount of information on their program, as well as the application form. Alternately, students can contact prospective graduate programs directly to ask for these materials. Students should learn what they can about the opportunities and requirements of each of the programs that interest them. It is worth reminding students that it is in a program's best interest to appear as attractive as possible, and thus they should try to collect and evaluate information from a number of sources.

THE APPLICATION PROCESS

Although applicants to graduate school may not recognize it, the process of applying to graduate school is very different from applying to college. Indeed, high school students can be pretty sure that the individual who reviewed their application was a full-time admissions officer. Moreover, because of the large number of applicants, they probably had few opportunities to influence their chances of being accepted into college, other than submitting the best application they could. In general, neither of these characteristics are true when applying to graduate school.

Admissions committees for graduate programs are comprised primarily of researchers in the program. (One or more graduate students may also be involved.) The committee will review all materials that are likely to indicate whether or not the applicant will ultimately succeed as a professional, rather than just looking at previous grades or the results of standardized tests. Moreover, because the number of individuals applying to graduate school is relatively low compared to college, the process can be much more individualized and even interactive.

We recommend that students identify a few faculty members in each potential graduate program with whom they would like to work, learn about their research interests, and then read some of their papers. Then it is advisable for the students to contact those faculty directly. In their letter of inquiry, they should indicate that they are applying to the graduate program, express their interest in the faculty member's research, mentioning the basis for that interest. Taking the initiative to contact faculty demonstrates a high level of motivation. It also provides students with the opportunity to develop an ally who may be willing to champion their application.

It is often helpful if the student makes these contacts prior submitting their application for admission, as they can list in their cover letter the names of faculty with whom they have spoken. Thus, the spring of the student's junior year is not too early to initiate communication. However, up until the time the student's application to graduate school is reviewed, it is not too late for such contacts to influence the admissions committee's decision.

Students should be cautioned not to view a lack of interest (or a lack of response) on the part of the faculty member as a sign that the student is not a good candidate for the graduate program. Although this may sometimes be the case, there also are a number of other explanations, e.g., the email was sent to the wrong address or the faculty member they contacted may not have space in their lab for a new student.

Some students will send a generic "one size fits all" letter of inquiry to all of the faculty they identify. This is a bad idea – faculty members spot those sorts of letters within a few seconds, and it does not lead them to develop a very favorable impression of the student. Likewise, students should avoid telling more than one faculty member within a program that they are their first choice for an advisor, as letters of inquiry may be circulated among the faculty.

We encourage students to apply to five or six graduate programs. They should apply to a "long-shot" i.e., a

program that they think is so competitive that they might not be accepted. And they should apply to a program that they feel they are quite likely to get into (that still meets the standards necessary for a worthwhile education). Most programs charge an application fee (e.g., \$50), and this can add up. However, some programs waive the fee for individuals who apply via their web site, and many programs will waive the fee if a student indicates financial hardship.

Students should assemble the various parts of their application (Appendix 2) and submit them by the deadline, which is usually in December or January for admittance in the fall. In a few cases, programs may be willing to consider an application after the deadline. However, if it is well past the deadline, the program may not have any financial aid remaining to support the student's first year of training.

PREPARING FOR AN INTERVIEW

Applicants who make it through the initial screening process may be asked to come in for an interview. Although not all schools require this, we *highly recommend* that students visit any program they wish to attend. It allows the student to get a sense of the program, faculty, institution, and local area before they make a five to six year commitment. Of course, it also indicates that student's high level of interest. If the institution will not cover the cost of this visit, we encourage students to see if they can find a way to finance the trip. If a visit is simply not possible, then at least a phone interview should be sought.

Visits are often scheduled for February and March, usually for one or two days. Students should be involved in planning this event. We advise them to contact the program and indicate who and what they would like to see, including specific faculty members, graduate students (preferably without faculty present), and the local community. Students should make sure they get their itinerary in advance so that they can prepare for all of the people they will meet. It is important that they be well informed and able to ask intelligent questions.

We encourage students to practice answering questions that are typically asked during the interview. After they have practiced on their own, they should then do a "mock interview" with a partner. Indeed, if the student spends a few minutes thinking about what they would want to know if the roles were reversed (i.e. they are a faculty member interviewing a potential graduate student), they can anticipate many of the questions they will be asked. Common questions include the following: Why do you want to go into neuroscience? Why are you applying to this graduate program? What other schools have you applied to? On what basis did you decide which programs you would apply to? To what do you attribute the poor grades you got in your freshman year? Where do you see yourself in 10 years? What did your independent research entail?

Questions about the student's research are among the most crucial, and it is essential that the student is able to talk about their work. The student will need to explain what they did and *why* they did it. For example, students might be asked to describe the importance of the protein they

studied or asked why they used a particular model of a disease or method of analysis. Answers such as “that’s what they were working on in the lab when I started” or “that’s what I was told to use” reflect very poorly on the applicant. Even if those were the initial reasons, students should develop their own rationale. The student should also be prepared to summarize their results (bringing along some graphs can help), discuss the implications for future studies, and place their work in a broader context. And they should be up-to-date on related experiments currently underway in their research advisor’s lab, as well as the field more generally.

On a related note, in the United States it is illegal for faculty to ask a candidate about their age, race, religion, ethnicity, sexual orientation, marital status, or number of children. However, students may be asked such questions anyway. Most of the time such blunders are innocent: an attempt by a less experienced faculty member to make conversation. We recommend that students try not to take offence. Instead, they can politely indicate that nothing in their personal life will interfere in anyway with their ability to succeed as a graduate student or, later, as a professional.

VISITING A PROGRAM

It is essential that students understand that while they are visiting the program, they are *always* being interviewed. That is, even at what may appear to be a purely social function – a dinner with graduate students or a departmental reception – they are still being evaluated. Indeed, it is common for graduate students, postdocs, and staff to provide the admissions committee with feedback on the students interviewing for graduate school. Thus, they need to be on their best behavior, prompt for appointments, and dressed appropriately.

Even though graduate students often wear t-shirts and jeans, it would be a mistake for the applicant to dress like that when they are on an interview. This includes their flight there if someone might pick them up at the airport. Students need not wear a suit, but they do need to appear neat and professional. For example, slacks and a coordinating sports coat or blazer would be fine (Fiske 1997, 1998).

When individuals enter a graduate program, they are committing themselves to several years in that location, so we emphasize to students the importance of “interviewing” the faculty and current graduate students as well as being interviewed. They should come with specific questions, which can be written down in a notebook if they wish. We encourage students to take notes right after (or brief notes during) their discussions with others. Otherwise, after they have visited several graduate programs, the information that they gathered on the programs may blur together.

Students should be warned that few individuals are willing to criticize their colleagues or their program when they are talking to someone who is interviewing. Thus, students should watch for caution signs such as vague or awkwardly worded answers, or weak enthusiasm. Often times graduate students are willing to offer more candid impressions on the program and faculty (provided that faculty are not around). In order to tactfully broach the

issue, the undergraduate could ask graduate students about the management styles of different faculty within the program. Another way to get information on potential advisors is to contact students who have previously studied with a given faculty member and to ask them about their experiences.

Finally, students should be sure that the locale can provide anything that they feel is necessary for their personal life. For example, they should ask to see areas of the city where housing is affordable for students. If interaction with members of a particular religious or racial/ethnic community is important to them, we encourage them to explore that possibility, as well. And lastly, if they have or anticipate having a child, they may wish to learn about daycare options.

FOLLOWING UP AFTER A VISIT

When they return from an interview, we recommend that students promptly write notes (email is fine) to the key individuals they visited thanking them for their time and reiterating their interest in the program. Students are usually notified in late spring for admittance to the program in the fall. Unless the first acceptance letter a student gets is from the school that is their top choice, it is usually worth their waiting to see what other responses they get before accepting a specific offer.

REFERENCES & RESOURCES

- Association of Neuroscience Departments and Programs (ANDP) www.andp.org. *Their website contains a listing of graduate programs in neuroscience along with basic statistics and contact information for those programs.*
- CRISP database on NIH awards. crisp.cit.nih.gov
- Faculty for Undergraduate Neuroscience (FUN). Homepage: www.funfaculty.org. Also see their listings of internship opportunities www.psych.westminster.edu/psybio/internops.htm.
- Fiske P (1998) Dressing for Success: Female Case Study. *Science Next Wave*. nextwave.sciencemag.org/cgi/content/full/1998/10/22/5
- Fiske P (1997) Dressing for Success: Male Case Study. *Science Next Wave*. nextwave.sciencemag.org/cgi/content/full/1998/03/29/195
- GRE (Graduate Record Exam) www.gre.org. *For learning aids developed by the makers of the exam, see www.gre.org/pracmats.html#gentest. For courses and materials offered by private companies that are not affiliated with the makers of the GRE, search the internet for “GRE preparation.”*
- National Institutes of Health. Research and Training Opportunities at the National Institutes of Health: About the Summer Internship Program. www.training.nih.gov/student/internship/info.asp
- National Institutes of Health. Ruth L. Kirschstein National Research Service Award (NRSA) Stipend Increase and Other Budgetary Changes Effective for Fiscal Year 2004. Notice NOT-OD-04-023. grants.nih.gov/grants/guide/notice-files/NOT-OD-04-023.html
- Peters RL (1996) Getting What You Came For: The Smart Student’s Guide to Earning a Master’s or a PhD New York: Noonday Press.

Pubmed www.pubmed.org. A free searchable database of scientific publications.

Sperling's Best Places: Cost of Living Calculator.

www.bestplaces.net/col/col.aspx. There are several cost of living calculators on the web that help you compare relative differences in major living expenses for two. We recommend this one because it provides a breakdown of costs for housing, food, transportation, and utilities.

Stricker EM (2003) The 2003 ANDP Survey of Neuroscience Graduate, Postdoctoral, & Undergraduate Programs.

www.andp.org/surveys/reports/2003/

TOEFL (Test of English as a Foreign Language)

www.ets.org/toefl/

Received August 17, 2004; revised October 08, 2004; accepted October 12, 2004

APPENDIX 1. Variables for students to consider when choosing a graduate program

1. The faculty High school students often decide which college to attend based on the reputation of the institution. However, in choosing a graduate program it is critical that they focus primarily on the reputation of the *department* of interest, especially their faculty. This is the single most important variable in determining the quality of the graduate training they will receive.

a. Research focus After looking at a graduate program's website or brochure, students should do a "literature search" on some of the faculty that interest them using a database like *Pubmed*. Then, they should read one or more of the faculty member's research articles to see if this is the sort of work they are interested in pursuing. The closer that the student's interests match those of the faculty, the better the training the faculty can provide. (Students are likely to get more attention from the faculty, as well.)

b. Number of faculty that share their interests Students need to make sure that they are part of a *community*. Indeed, there is no assurance that the one person that they came to work with won't leave the institution after they arrive – even if that faculty member has been there for decades. Furthermore, being part of a community ensures that the student will be exposed to a wider circle of scientists who will tour the program as visitors and seminar speakers. This is important as far as providing intellectual stimulation, and it will also aid them in developing a professional network of contacts that they can later call on for advice and assistance in looking for jobs.

c. Quality of the faculty's research Students should examine the number of papers the program faculty have published, the reputation of journals in which they have published, and the quality of the research. Students may have little experience in evaluating research and thus may need special assistance in this regard. In addition to examining the faculty's publication record, a student can also investigate the level of external grant support obtained by faculty in the department. Students could ask faculty members or the department chair about the level of external funding, or else they could check the *CRISP* database of grants awarded by NIH.

d. The faculty's ability as educators Obviously, the faculty need to be good researchers, but if they aren't interested, or don't have the time or the skills to teach what they know, then students will not benefit from their expertise.

2. Requirements for getting a PhD Programs vary widely. Coursework, teaching, research rotations, and exams often are involved. In some programs students begin by doing research; other programs may require two years or more of coursework before they are exposed to the lab. Students should be sure that they have input into the process of deciding exactly what will be required for their degree. However, they should also be wary of programs that have no specific requirements; by entering these programs they run the risk of being ignored.

3. Time it takes to obtain a PhD Students should try to find out the average for individuals in the graduate program as well as for those in their potential advisor's lab. Many faculty members say that it should not take more than five years to obtain a PhD. However, a national survey of 83 graduate and postdoctoral training programs in neuroscience conducted by the Association of Neuroscience Departments and Programs revealed that of the individuals who obtained their PhD in the 2003 academic year, the *average* time to degree was somewhat longer (5.6 years). Moreover, the range extended seven years and beyond (Stricker, 2003).

4. Number of graduate students Again, students should try to get this information for both the overall graduate program as well as the specific laboratory in which they hope to work. It is desirable to have a critical mass of other students to work with; however, it is also important that there are enough resources (and attention) to go around.

5. Diversity of the students and faculty How many women and individuals of color are there in the program? What programs, if any, are in place to assist with retention? Many programs state that they are interested in promoting diversity – but how successful are they in attracting a diverse population of students, and what percentage of those students complete the program successfully?

6. Success of previous students Good positions mean good training and assistance in finding jobs. Some graduate programs have begun to include this information on their website. If it is not, students should not hesitate to ask for it.

7. Financial aid Most graduate programs in the biomedical sciences pay tuition and other school fees as well as provide students with a modest stipend to cover their living expenses. They may also provide health insurance. As of 2004, the stipend for graduate students who have a fellowship from the National Institutes of Health is \$20,772 per year (NIH 2004). Many graduate institutions use this as a guide for determining the size of the stipends that they provide to their students.

When examining a financial aid package, we stress to students that they should not let a difference of a few hundred, or even a thousand, dollars in stipend influence their choice of programs. They need to keep in mind that the reason they are going to graduate school is to get training that will prepare them for the rest of their career, not to make money – there are much easier ways to do that. Moreover, large differences in the amount of stipend provided can often be accounted for by differences in the regional cost of living (see *Sperling's Best Places*).

8. Additional obligations Students who receive financial aid are often required to work as a teaching assistant (TA) for a specified amount of time. Students should find out in advance what this entails. Specifically, what is a TA expected to do – grade homework, run recitations, design exams?

APPENDIX 2. Common Components of an Application

Listed below are the typical components of an application to graduate school. However, the materials required vary from program to program. Students should be sure to follow the instructions specified by the program to which they are applying.

1. Application form Students will be asked to fill out an application with the standard sort of information: name, contact information, list of individuals who will be writing letters of recommendation, and so forth.

2. Personal essay Applicants are usually instructed to write about one or more of the following: their motivation, research interest, research experience to date, interest in this particular graduate program, and short- and long-term goals. Students should be as specific as possible. Having done some research on the program and faculty, applicants should indicate in their essay why they have chosen this program from among the others that are available. However, caution them *not* to send the same essay to each school – instead tailor each essay for the specific program to which they are applying.

Their essay should be well written, as it will serve as a writing sample as well as an indication of their professional interests. They should try to get at least one faculty member they know to read and comment on their essay before they submit it. They should use a word-processor – with a spelling and grammar checker. Lastly, appearance matters. Thus, they should take the time to format the document so that it is neat and easy to read.

3. Samples of work Samples of work can provide the admissions committee with a much better idea of the applicant's potential than the committee would gain from a student's transcript alone. In fact, many programs feel that samples of a student's work are more indicative than grades in predicting how that individual will do in graduate school. Students might provide a manuscript, abstract from a scientific meeting, papers that they have written for a class, or a report from an independent study. They should include examples from any research experience they had, even if it is in a different field. If they do not have any samples, it may not be too late to do an independent study. This shows initiative and is a good strategy for overcoming low grades on their record.

If there is something that the student feels would strengthen their application, they should submit it (even if the committee did not ask for it). We advise students not to worry too much about overwhelming the committee with paper. On the other hand, if they submit a crate of materials, the committee may not look at anything, so they need to be selective. Students who have a lot of materials could include a few key items in their application and provide a letter that details the additional items that they will make available upon request. Students should keep a copy of anything that they submit; some programs do not return materials submitted as part of the application process.

4. Transcript The admissions committee will review the student's grades and the difficulty of the courses that they took. It is advantageous for students to take the most challenging classes they can (and do well in them). But a B in an advanced and relevant course can mean more than an A in an easy and/or tangential course. It is also preferable that students focus their efforts in one or two areas. If their overall grade point average (GPA) is low, they can try calculating it without that first year or two during which they had low grades. Alternately, they can calculate what their GPA is in the courses most relevant to their academic interest. If either of these calculations help, they can indicate this in their cover letter or in their essay. Lastly, if a student's transcript is not in English, most institutions will require

them to submit a certified English translation along with the original version.

5. Graduate Record Exam (GRE) scores There are two components of the GRE, a general test and subject tests. The general test has seven parts, which are divided as follows: two verbal sections; two quantitative sections; two analytical section; and one experimental section. (The experimental section is used by the company that writes the GRE to test new questions. The scores from this section are not reported to students or their specified institutions, however, when individuals are taking the test they will not know which section is the experimental one.) There are 17 different subject areas in which a GRE test is available. Topics include chemistry, physics, and biology. Students should check with programs of interest to see if a subject test is required. There are a variety of practice manuals, software programs, and courses designed to help students improve their GRE scores. The makers of the GRE offer a variety of aids, several of which are free. A number of private companies have also developed courses and materials to help students prepare for the GRE. At the very least, students should make sure that they are familiar with the exam format.

6. Test of English as a Foreign Language (TOEFL) score If the applicant is from a country in which the official language is not English, they will be asked to submit the results of their TOEFL exam.

7. Letters of recommendation Letters of recommendation are extremely important. Usually three or four letters are required. However, this is a minimum, and students should feel free to submit a couple of additional letters if they wish. By arranging for more than the required number of recommendations, the review of their application will not be delayed if one of the letters does not arrive on time.

The best letters of recommendation are written by people who know the student well. We encourage students to get letters from individuals who are familiar with their academic pursuits or work experience. Letters from faculty working in the student's field of interest are particularly valuable, especially if that faculty member has contacts within the prospective graduate program. Students are sometimes surprised to learn that letters from friends, clergy, or senators (unless the student has worked for them) are generally not useful; nor are letters from a faculty member whose only knowledge of the student is from when that individual took their very large introductory course.

It can be useful for the student to spend time educating the individuals who will be writing a letter. We encourage students to provide the reference with a copy of their personal essay (#2 above) and to offer to meet with the reference for half an hour to describe their interest in graduate school. This time will enable the reference to get a better impression of the student's interests, and often leads to a more detailed letter.

Faculty will be much more likely to submit the letter of recommendation by the deadline if the student provides them with a friendly reminder about a week before it is due. Most faculty appreciate this. Another strategy is for the student to check with faculty's secretary (if they have one) to see if their letter has been sent.