

WHAT THEY DO NOT TELL YOU IN GRADUATE SCHOOL: OBSERVATIONS FROM THE FIELD

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ABSTRACT

This panel is designed to provide graduate students with information about career options. We hope to provide some insight into: the kinds of things they can do to prepare for the job world while still in graduate school; the process of finding and selecting a job; and, how success on the job is assessed in the first few years.

INTRODUCTION

Panelists represented industrial development (in telecommunications, business applications, the computer industry, and banking), small business research and development, and academia. Each panelist responded to five questions:

1) What are the skills, knowledge, abilities and "rules of the game" that: a) transfer well from graduate school to the working environment? b) you probably will not learn in graduate school?

2) What does the working world value in looking for job candidates?

3) What important questions should you ask about a company to determine whether you could be successful working there?

4) What do employers expect of a new bachelor's, master's, and Ph.D. -level hire?

5) How does assessment of successful performance in graduate school differ from the ways in which success is defined in the working environment?

SKILLS TRANSFER

Everyone in the panel agreed that analytical problem solving skills were the key skills that transfer from graduate school. They also agreed that the key skills that are not addressed in school include: teamwork (especially in multi-disciplinary teams), communication, intellectual compromise, time management, and leadership. The following are the individual perspectives on this subject:

Telecommunications Product Development

A Bell Labs informal study found that the two attributes

which were by far the best predictors of success were a Ph.D. and training in the behavioral sciences. Why is this not surprising? It is because the most important skills learned in graduate school are not dependent on the content. Most importantly, we learn how to acquire a lot of information quickly, how to make sense out of it, how to identify the problems that are implied by the information, and how to lay out and complete a plan to resolve the problems. It probably also serves many of us well that we learn how to work very hard in pursuit of the resolution of those problems with very few resources. We are forced into being creative in achieving our goals. In general, training in behavioral science research methodologies teaches us: to listen; objectivity in otherwise emotional situations; and, a commitment to people.

Three skills that you probably aren't going to be trained in graduate school are: communications, teamwork, and intellectual compromise. You will have received many opportunities to speak, listen, and write persuasively. It is important to try to get feedback in these areas. Some graduate experiences give you an opportunity to work on teams. It is the ability to work on teams effectively, to be viewed as a valuable member of the team, that most characterizes successful performance in the companies in which I have worked. This is particularly challenging in that, unlike a team of graduate students, the teams you may be working on will be very diverse. Human factors will probably not be on the top of everyone's priority list. A further skill that I have observed new graduates struggling with is the problem of intellectual compromise. In graduate school the goal is to get the definitive answer, to find truth in some sense. In the real-world, time and resources run out. The goal is not so much to find truth as it is to make something better than it would otherwise be, within the given constraints.

Business Applications Development

To generalize, if a person has learned to motivate him- or herself effectively throughout graduate school, rather than relying on external sources of motivation, that is certainly an advantage in the workplace. Usually too, interpersonal skills, written and spoken communication skills, knowledge of professional content areas and subject matter, and independent thought do transfer well from graduate school to the work environment. Often, though, one does not learn in graduate school to work well in groups or teams where individual members have different goals and desires; real-world negotiation skills are also sometimes less well developed within this context.

Computer Product Development

In graduate school you have developed outstanding analytical and problem solving skills which will be of significant benefit to you in the "industry" world. Specific knowledge gained in research and classwork will be of value to you in some assignments as well. There are some skills however that you will not learn graduate school: time management (work not completed in a timely manner may be of no, or limited, use); executive communications (learn to present your entire results in five or six sentences, one page summaries or whatever your executives will attend to; teamwork (this is key to survival in business, whereas the university system is geared more to individual rewards); at times you'll need to make educated guesses (you will need to know when it is reasonable to do so. Hint: it is usually reasonable to do so far more often than it is not); the 80/20 rule applies a lot in industry. It takes 20% of the time and effort to do 80% of the work. Take advantage of it whenever it is reasonable to do so.

Corporate (Banking) Application Development

If you have worked on multi-disciplinary project teams, those skills will transfer well. The system perspective you bring to a project team will be valuable. Comfort with speaking in public is an asset. Business skills, such as negotiation, persuasion and business writing will prove critical. Since you will likely be working with multi-disciplinary teams and constantly working within project constraints, business communication skills are extremely valuable. In addition, you cannot write like an academic within the corporate world - no one wants to read something that sounds like it should be in a journal. Also important are: the ability to speak "other" languages to talk to product owners, developers, creative and marketing people, etc; and, the ability to adapt to different types of design life cycles. The successful human factors practitioner will be able to adapt in order maximize the human factors impact, no matter what stage of design he/she is involved in. Another

important skill is the ability to sell human factors in terms that are meaningful to other disciplines.

In the application development world, very few people will listen to - let alone respect - someone who doesn't understand the needs and constraints of the business. Project time lines and budgets are often the real drivers in application development (for better or worse) and other considerations often give way before them. As human factors professionals, we must respect the trade-offs that must be made during any application development (and remember that these trade-offs are not exclusive to human factors issues).

Academia

The most important skills I learned in graduate school pertain to research. From research design to research presentation/publication and all points in between. I have used these skills not only to conduct research, but also in my teaching. Knowing how to use statistics and interpret data is invaluable. Of course, as a teacher the general knowledge that I gained in graduate school is my bread and butter. This is true not only of courses that I took that I now teach, but other courses as well. In preparing lectures, I have drawn from courses that I thought were unimportant in graduate school, but have turned out to be essential.

Learning to maneuver around the work place is a skill that they don't teach you in graduate school. You are not taught explicitly how to best spend your time, for example. It is very important in academics that you give appropriate attention to things that matter: teaching, research and service, and that you do not over commit yourself in any one area. The tenure and promotion committee expects you to understand this, but no one voluntarily explains it to you. You have to seek out this information for yourself. Worst of all, there is no one right answer it varies from school to school and even from department to department.

Small Business Research & Development

Some of the skills that you learned in graduate school and that you will also need in the work place include: report writing; subject matter knowledge and where to find information; having a wide perspective so that you can consider alternative solutions; and, oral presentations. You gain limited experience in presenting in class and for defenses, but these experiences are very useful, and you should seek opportunities to present your work; self-motivation and discipline to schedule time to make sure you can get things done within the time-frame allotted are also transferable skills.

Some of the skills that you may not learn in graduate school include: teamwork as a member of a team with diverse backgrounds; leading projects; allocating resources; budgeting time; doing the best job within the constraints;

encouraging and stimulating the team to do good work; being flexible, replanning, taking a step back to reevaluate, and, compromise. The type of writing expected in the business world has distinct differences to academic writing. You will need to communicate the technical work in a simple manner so that it speaks to a wider audience.

HIREABLE CHARACTERISTICS

Panelists tended to agree that work experience through internships, and communication skills (both written and oral) were highly valued attributes. Publications and content knowledge, on the other hand, may or may not be desirable dependent on the career.

Telecommunications

As I look through a resume, I look at the quality of the school and evidence of performance at the school. I look at the degree received. I look at the dissertation topic and publications to see if the candidate worked with content that might provide value added to my organization, and I am looking for innovation, professional recognition of the quality of the work, and initiative. Finally, I look for relevant work experience. Experience that catches my interest includes internships in my industry, or in application areas in which we are starting to work. Novel experience such as evidence of successful consulting is also of interest.

In a phone interview I am assessing communications skills, and I am also trying to understand what the candidate really enjoys doing and wants to do in the future. If the candidate passes the phone interview, I will invite them in for an interview visit. The goal of the visit is to continue the process of mutual openness. Usually I will have the candidate do a job talk to the group, and then a series of interviews will take place. We will be looking at the technical quality of the work, and other presentation and communications skills. I will also be looking for evidence of a questioning and creative mind, and the kind of energy even in the job interview that I am hoping can be directed towards projects in the future. I try to probe to assess whether they can learn quickly, and I look for evidence of poise and maturity.

Business

Job candidates with a strong combination of relevant internship experience and solid coursework are the clear winners here. Nothing else really can substitute for the real-world exposure that a professional internship provides combined with mastery of the body of knowledge in the domain within which work will be undertaken. Presentation skills and teaching ability are also factors of interest if the particular position in question calls for the set of skills that underlie success in these areas. Life experience and

publications are often weighted more heavily in mid-level positions rather than entry-level jobs.

Corporate (banking)

The following are some of the skills and experience that are valued in job candidates: experience in working with multi-disciplinary teams; ability to be highly flexible (e.g., switch between rigid to uncertain environments); communication skills; broad human factors skills; and, evidence of other business skills.

Academia

Here, publications are essential on the job market: published, in press, and submitted. Presentations are important too, but what matters is the ability to take research to the final stage. Coursework is only marginally important. The specific courses you take are important only in proving that you are indeed qualified to teach in a specialty area (e.g., cognition). Every academic job interview requires that you speak. This means either a research presentation or a lecture. The presentation skills I learned in graduate school, both in informal research presentations, and teaching were invaluable on the job market. Take every opportunity to teach and present research.

Teaching experience is very important as well. The smartest thing I did in graduate school was to teach courses on my own and be able to present good evaluations as proof of my effectiveness. If you aren't able to teach an entire class then take every opportunity to guest lecture and request that the students evaluate you (see "Teaching Tips" by Wilbert McKeachie, 1994). If you want to teach and consult on the side, then an internship may benefit you. Once you start teaching and carrying out a research program, you will have little time to develop the skills you will need in industry. It would be wise to take advantage of the time spent in an internship to gain valuable experience needed in consulting. This would also hold true if you wanted to teach part-time and work in industry part-time.

Small Business Research & Development

The most important skills include: critical thinking, ability to contribute to an effort, to question, to analyze and argue coherently for a point of view. Publications and course work are less essential but some pre-requisite areas of competence are usually required. Writing skills are also important. The ability to be open to different approaches and critically assess their value is important. This requires a degree of maturity gained from life experiences, internships, and teaching (learning from people who do not understand or speak "the language").

INTERVIEW QUESTIONS

The following were felt to be important questions and types of information that you should be asking about in a job interview:

Telecommunications

What are the types of work that typically come to the department? What is delivered by human factors at each stage of the development process and to who? What are the challenges that the current department struggles with in getting their work implemented, and how are the challenges typically resolved? Who are the champions and is the effectiveness of human factors growing? Are the necessary resources available? How will your skills be grown and what are your career path opportunities? What is the support for professional activity? Finally, do you like the people you have met, and what do they think of their management?

Business

Learn all that you can about the company itself from a variety of sources. Questions that are important to ask are those that give you information which addresses areas that are personally important to you, so a certain amount of self-knowledge is the key to this process. A general set of questions that most prospective employees would ask might include: What is the reason that this company is in business? How would this job contribute positively toward that? Am I comfortable with the people with whom I would be working? Am I capable of performing the tasks required, and would I enjoy doing so over a period of time? What are the compensation and benefits, and are they adequate for me? Where would I work, and is that acceptable to me? What is the potential for personal and professional growth in this company?

Computer

What work would I be doing? How do you measure your success? How does your management measure your success? What accomplishments are you most proud of in the past year? What impact have you personally had? What percentage of time is spent on research, product design, writing code, consulting, testing...? What is a typical day like for you? Who are the people I'd be working with? What are they like? How much travel is involved? To where? How many hours do people work per week? Are the hours fixed or flexible? Can one telecommute?

Corporate (banking)

Where does human factors fit into the company's design life cycle? What is the definition/understanding of human

factors within the company? How much support/"buy in" for human factors exists at the executive levels of the company and at the project team level (especially developers)? What is the history of human factors within the company? If human factors was not applied well (e.g., by those who were not formally trained), you could be working in an environment that is full of misconceptions about what you do. What will I as an human factors professional be expected to do? What is the evaluation/reward structure for those on a project team? This will impact your own evaluation; however, perhaps more importantly, this will be indicative of what the company values in others. Is there financial support for attending conferences and courses? Is publishing encouraged? Discouraged?

Academia

The following are a few of the key questions to ask when on an academic job interview (for a more thorough treatment of the academic job interview see "The Compleat Academic" by Zanna & Darley, 1987). First you should ask questions that allow you to pinpoint the expectations in terms of research and teaching. For the human factors professional it is also important to determine if outside consulting is not only acceptable, but considered worthwhile. If you want to consult, but your institution does not value it, then you are in trouble.

Small Business Research & Development

What is the work environment like? E.g. deadlines, how much research versus development of products? Who are the people that I will be working with? What's the atmosphere like? E.g. dress code, work practices, hours/flexibility. Is there a match between the vision/goals of the company or group you're working with and your own personal career goals/working goals. Even though you might be happy just to be offered a job at this point, there comes a time when, "where do I see myself in 3-5 years?" is a question that you have to answer for yourself.

EXPECTATIONS OF NEW HIRES

The panelists agreed that new hires should be enthusiastic to learn (learning certainly does not end with graduate school), should possess a core set of skills required for the position, and should develop good working relationships with coworkers. A bachelor's level new hire is expected to work under broad guidelines and to implement the work assigned under the direction of a project lead. They tend to be more involved in the evaluation and testing aspects of development rather than at the design stage. A master's level new hire may be expected to take on specific project leadership roles including: identifying issues, negotiating milestones, laying out a work plan, and executing it. The

Ph.D. -level new hire will be expected to take a system wide leadership role and shape the work program from very general direction. They are expected to provide innovative solutions, manage multiple projects simultaneously, and may also have marketing responsibilities.

SUCCESS

In graduate school, the definition of success is fairly well defined. You pass or fail exams, you receive a grade, a dissertation is completed and defended successfully, or a paper is published. You don't even need to look for feedback; it is just given to you in most cases as part of the educational evaluation process. In business and academia, however, the definition of success is often blurry, and feedback is definitely not handed to you on a plate. Oftentimes the technical quality of the work is of less importance than the impact it has on the customer and whether the customer is happy with it, provides follow on work, or distributes the work. The success in this case is measured in terms of customer satisfaction and follow-on work. A successful worker may also be defined in terms of their ability to work in a team effectively, lead effectively, bring in projects on time and within the budget, and communicate findings effectively in presentations and reports.

Most importantly, in the business and academic worlds, you must be prepared to be proactive in obtaining feedback. You will have to ask for specific feedback on your writing skills or presentations skills. You will have to follow up on a project with a customer to see whether the customer was happy and whether your work has received outside recognition or if you have been referred for further work. In the academic world, you have to get your own student evaluations and evaluations from colleagues on your teaching ability. To know whether or not you are doing a good job will involve a good deal of actively seeking and interpreting feedback throughout the year and self-monitoring how you are doing, making adjustments if necessary.

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Note: The views expressed in this paper are those of the individual participants only and do not necessarily reflect the views of the organizations for which they work.