The Unknown Unknowns:
Challenges, Opportunities, and Recommendations for Graduate Students from the Perspective of Postsecondary Administration

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ABSTRACT

Graduate education is influenced by trends and events that are political, economic, social, technological, and demographic. These materialize into challenges and opportunities for graduate students, an overview of these is provided in the paper along with recommendations for navigating graduate education, written from the perspective of individuals who have successfully completed graduate school, who have served (or continue to serve) in faculty positions, and who can offer advice via their roles in administration. As expressed through the paper, the opportunities outweigh the challenges, particularly if you are deliberate in your roadmap, relentless in your quest to be informed, are wise enough to know what you don't know and ask questions (lots of questions) until you know the things that were, simply, not on your horizon.

Keywords: *Challenges, Graduate Education, Graduate Students, Postsecondary Administration*

INTRODUCTION

There are things in life that we know and of course, there are things we don't know— some of them essential for our well-being and others not nearly as relevant. However, by far the most important category in life represents those things that we don't know but remain *unaware that they are vital to our success.* In many respects these unknown unknowns[1] have the greatest impact in graduate education and are the ones addressed in this paper. This is not a report on the state of graduate education (readers interested in this may wish to review the latest report of the Council of Graduate Schools, *Graduate Education 2020 (Council of Graduate Schools, 2009)*) nor is it an empirical study of factors that relate to success in graduate education—see

DOI: 10.4018/IJAVET.2015100103

for instance (e.g., Gupta & Turek, 2015; Herrera & Blair, 2015; Johnson-Motoyama & Mitchell, 2014). Rather, this paper is intended to provide current and prospective graduate students with an overview of challenges, opportunities, and recommendations for navigating the educational landscape, written from the perspective of individuals who have successfully completed graduate school, who have served (or continue to serve) in faculty positions, and who can offer advice via their roles in administration.

CHALLENGES

We'll start with the bad news first. Graduate education is a journey laden with challenges that are not unsurmountable, but challenges none-the-less. The more aware you are of these challenges, the less bumpy the road to and through graduate school. We will outline what we believe to be some of the biggest challenges in graduate education, however this is (unfortunately) not an exhaustive list.

1. **Funding Graduate Education:** Whether you are funding your education or whether you are receiving aid from your institution, the question of how this is going to get paid is often one of the first reality checks. Graduate school is not cheap for graduate students, and it is not cheap for institutions. The average total price (including room and board, books, transportation, and personal expenses) of a master's degree in 2011-2012 was about $23,000. In comparison, a research doctorate was $36,600 and a professional doctorate (e.g., medicine or law) was $48,900 (U.S. Department of Education, 2015). State funding for public higher education institutions has declined from 60% in the 1980s to below 40% (*The economics of higher education*, 2012). Influenced in part by the decreased state funding, the last few decades have seen dramatic increases in the cost of tuition for in- and out-of-state students (*The economics of higher education*, 2012). Funding is one of the biggest barriers to succeeding in graduate school (Lariviere, 2013). If you are a funded graduate student, you are both fortunate and (likely) broke. Graduate students who receive an assistantship are usually either teaching or conducting research as part of their funding package. About 2/3 of doctorate recipients have an assistantship or fellowship/dissertation grant as their primary financial support (Hoffer, 2006) with teaching or research assistantships being the major source of financial aid (National Science Foundation, 2015). The compensation beyond tuition reimbursement is often insufficient to actually live on. Graduate students that are not able to supplement their funding with additional scholarships or fellowships often have to take out student loans, take on other employment, deplete savings, and other creative strategies (Cassuto, 2011). For federal financial aid purposes, all graduate students are independent—which means that eligibility for need-based financial aid depends only on the graduate student's income and assets (College Board, 2013). In 2012-2013, graduate students received over $53 billion in student aid. Of this amount, about two-thirds (63%) was in the form of federal loans (College Board, 2013). In 2011-2012, about 70% of graduate students received financial aid with individuals receiving doctorate degrees receiving proportionally more aid (88% for professional doctorates, 82% for research doctorates) as compared to individuals enrolled in master's degrees (69%) (U.S. Department of Education, 2015). The field of study, part-time versus full-time attendance, and type of institution are all influencers (e.g., health doctorate field of study, full-time attendance, and attendance at a for-profit institution equates to higher proportions of financial aid) (U.S. Department of Education, 2015).

2. **Meeting the Demands of Graduate Education (e.g., Time to Degree, Research/Publication Expectations):** Graduate students have multiple demands from multiple stakeholders. Institutionally, there are many demands such as time to degree, most prominent at the doctoral level where there is usually an institutional requirement that the doctoral degree be completed within a finite time period (e.g., seven years). Time to degree also differs by discipline with science and engineering fields having lower time to degree than non-science and engineering (Hoffer, 2006; National Science Foundation, 2015). Relating back to the topic of financing graduate education, doctoral students who receive institutional support (e.g., assistantship or fellowship) have lower time to degree as compared to students who use their own or other resources to finance their education (Hoffer, 2006). Of doctoral students who receive institutional support, those with teaching assistantships had the longest time to degree, and this was mainly evident in biological sciences, engineering, and the physical sciences (Hoffer, 2006). Your graduate program may have requirements or expectations specific to their program, such as publication of *X* number of articles prior to graduation and enrollment (and completion) of *X* number of credits or classes per semester, and even whether or not a master's degree is required prior to entering the doctorate. Productivity to build your vita is a real and recognized stressor of graduate education (Crane & Perason, 2011). These demands may be philosophically important (e.g., information learned early in your graduate career may become outdated so a shorter time to degree helps ensure you are up-to-date in your field) and, at the institutional level, important for reasons of accreditation and institutional reporting. Knowing what are the demands and expectations may sometimes feel like a scavenger hunt, and meeting the demands may sometimes feel like a lofty goal, but these are much less daunting for graduate students who adhere to our other recommendations.
3. **Not all Roads Lead to Academia**: "A college major is not a destiny. College provides access to particular occupations and career pathways, but college is only the ante in the lifelong learning game" (Carnevale, Cheah, & Hanson, 2015, p. 4). Graduate education opens many doors, and the doors that are available to students attaining a master's degree are different (not necessarily better) than opportunities available to doctoral degree recipients. Both master's and doctoral degree recipients have both academic and non-academic options, with some degrees being predicted to be more lucrative than others (Coplan, 2015; Dill, 2015), and academic options being more extensive with terminal degrees (e.g., Ed.D. or Ph.D.) as compared to master's degrees. Even within academia, there are traditional faculty roles where responsibilities include teaching, research, and service, as well as non-faculty roles (Einaudi, Heuer, Green, & Kang, 2015). If you are currently enrolled or plan to attain a doctoral degree, keep in mind that there are many career opportunities outside academia including careers in the private sector (including starting your own company) (National Science Foundation, 2015). Within academia, there are what most consider traditional faculty positions (which consist of teaching undergraduate and/or graduates and which usually also expect some level of research and service) as well as non-instructional faculty positions (e.g., research scientists). Even if you *think* you know the path you want to pursue, explore other career paths while a graduate student. You may be surprised that a path you did not consider is actually the right one for you.
4. **Keeping the Right Perspective:** In looking back at our own experiences as graduate students, we did not always have (but would have been better had we held) the perspective that the end of graduate school was only the beginning of a career. In retrospect, it's easy to see that graduate school is a launching pad, the commencement—beginning—of future work in a discipline. The dissertation, a few short years after successful defense, will likely seem

'just another study,' and possibly 'not really the great study I thought it was.' (Faculty that are honest will likely admit both.) This is not to suggest that you shouldn't hold yourself to high standards—most certainly do that. But graduate school is just the beginning. If you can keep the right perspective, you will enjoy the journey at a different level and will likely end up getting more out of it.

5. **Dealing with Scarcity in Graduate Work:** Another way to think about the challenge of graduate work is to view it through the lens of scarcity (Mullainathan & Shafir, 2014). At the intuitive level the concept is familiar to most of us because we have experienced it at some time or another. There is not enough time, money, resources, support, or space to get the job done properly. When stressed, people can create an extensive scarcity. Furthermore, at the common sense level we believe that with more of everything things would go much more smoothly and of course we would much more productive. A good example may be found in our positions as faculty members. There is not one of us who hasn't said at one time or another something like. "If I had just a few more days this paper would have been so much better." In these situations we simply lay the blame at the feet of scarcity that prevented us from achieving our optimal, article, book or class presentation.

Mullainathan and Shafir (2014) go on to make a compelling argument that extreme scarcity can impact cognitive performance. Metaphorically they explain this in terms of band width. In these situations, your ability and cognitive capacity are not diminished, but there are so many demands placed on that ability that there is simply not have enough band width to handle everything, therefore, we find ourselves in the classic multitasking scenario. For instance, as a graduate student there is a good chance (high probability) that you might have two projects due for classes, a presentation to prepare, some research to complete for your advisor, a class to prepare, and a problem in your scholarship application with which you have to deal- all due within a couple of days. We hope that you will agree that your ability to function effectively in these situation downgrades considerably. The price we pay in these situations is what Mullainathan and Shafir (2014) call the band width tax—we simply do not have enough band width to handle it all. Another way to conceptualize is thorough the concept of excessive cognitive overload in learning theory (Klingberg, 2009; Pijpers, 2010).

In addition to multitasking another consequence of scarcity is tunneling behavior caused by concentrating on one or two things in the metaphoric tunnel to the exclusion of other tasks. For instance, I will complete the research for my advisor (I may be taxed but I'm not a fool) therefore my papers will have to be late, and I'm not really going to be prepared for class. Another way to address this is that you just don't have enough slack in your schedule to get everything done. Managing scarcity in most graduate programs will be a considerable challenge but strangely an opportunity as well because out there in the world most of us deal with it on a regular basis.

OPPORTUNITIES

Now the good news. Graduate education is a journey laden with opportunities that are ripe for picking. The more aware you are of these opportunities, the more successful will be the road to and through graduate school. As with challenges, we will outline what we believe to be some of the biggest opportunities in graduate education. Even better news… This is (fortunately) not an exhaustive list.

1. **Positive Cost Benefits and Workforce Trends:** In 2012-2013, there were over two million full-time equivalent (FTE) graduate students. This constituted about 13% of all FTE postsecondary students. The average growth in doctoral degrees awarded is about 3.4% and reflects a positive trend (National Science Foundation, 2015). Nearly 53,000 research doctoral degrees were awarded in 2013, representing the highest number ever reported based on data collected from the Survey of Earned Doctorates (National Science Foundation, 2015). In 2013, 74% of doctorate degrees were in science and engineering (National Science Foundation, 2015). "Doctoral education develops human resources that are critical to a nation's progress" (National Science Foundation, 2015, p. ii). In this way, they contribute to the country's increased standard of living, cultural development, and growth in the economy (National Science Foundation, 2015). There is a reason why advanced degrees are sought. Evidence suggests that earnings are higher for college educated individuals (*The economics of higher education*, 2012), and graduate degree recipients earn about 28% more than bachelor's degree recipients (average annual salary of $78,000 as compared to $61,000) (Carnevale et al., 2015). Although the proportion of doctorate recipients in 2013 who reported employment commitments upon receipt of their degree or after a postdoctoral assignment has shown a downward trend in the past several years (National Science Foundation, 2015), the economics of supply and demand may be in your favor, particularly if you are receiving one of the 'best' degrees based on one of the latest reports by *Forbes* or *Fortunes* (Coplan, 2015; Dill, 2015). According to a recent report by the National Science Foundation, "annual counts of doctorate recipients are measures of the incremental investment in human resources devoted to science, engineering, research, and scholarship, and they can serve as leading indicators of the capacity for knowledge-creation and innovation in various domains" (National Science Foundation, 2015, p. ii). Additionally, even though graduate funding may be a barrier to entry and completion, there have been changes in federal funding to broaden financial aid opportunities including Graduate and Professional Student PLUS loans (introduced in 2006) as well as increases in unsubsidized direct (Stafford) loan limited (enacted in 2007) (U.S. Department of Education, 2015). Even better news, in 2013, more than ¾ of doctorate recipients in physical sciences and engineering, more than 2/3 in life sciences, and about ½ in social sciences, humanities, education and other non-science and engineering fields reported that they incurred no graduate education related debt upon doctorate degree attainment.
2. **New Avenues for Graduate Education (e.g., Professional/Executive Degrees; Online Education):** Institutions have wised up to the fact that graduate school is not one-size-fits-all. Whether you consider it to be or not, graduate education is a business, and graduate students are the consumer. Without them, institutions would whither away. Administrators, faculty, and staff understand this, and it should be no surprise that institutions strategically position themselves with the goal of attracting the best and the brightest. Part of this strategic process unveils itself in the creativity which abounds in packaging graduate education today. This is particularly notable in disciplines that draw graduate students from practice, where students are likely to be employed while pursuing their graduate degree (e.g., education, business, health), where students may be in mid-career, and where an intended balance between rigor and relevance to practice is essential (Bennis & O'Toole, 2005). Graduate programs that can be completed in accelerated timeframes, on weekends, after normal operating business hours, and online on your own time abound with the thought being to package graduate education so that it can reach prospective students when and where it is good for the student. This has afforded access to graduate education for many individuals who otherwise could not commit to a graduate program offered in the traditional sense or on a traditional campus.

3. **Complexity can be Helpful**: If scarcity theory is correct you can see that it becomes easy to fall into the trap of "If I just had more, things would be better." Surely this seems like common sense but that may not necessarily be the case. Interestingly one of the principles of complexity theory (Forrester, 1971) suggests that in complex systems such as graduate programs the outcome are counterintuitive and don't respond to common sense. The problems associated with multi-tasking and tunneling appear to have a counterintuitive benefit as well. Mullainathan and Shafir (2014) call it the focus dividend. As your deadline gets increasingly close you will develop increased concentration, find a laser like in focus and buckle down to the task. They argue that focus dividend or heightened productivity comes from a fundamental human characteristic—scarcity captures the mind and forces us to do something that would have probably not done on our own.

Brown (2012) argues the common interpretation of this phenomenon is that we are hopeless procrastinators. However Mullainathan and Shafir (2014) point out that virtually everyone operates in this manner and that there are decided benefits. When deadlines are far away we simply do not focus on that task. Invariably, an abundance of time will even lead to a scarcity of time. In a sense abundance and scarcity are part of the same problem because they complement each other. Case in point, the three of us had an abundance of time to write this article. However, here we are just a few days away from the deadline, furiously writing and ironically probably better than if we had started weeks ago. In your graduate program you will experience the focus dividend that comes from having tight deadlines.

4. **The Many Modes for Learning:** We write this article from the University of Central Florida (UCF) that currently enrolls approximately 63,000 students, making it the second largest institution of higher learning in the country (www.ucf.edu). With a population that large, one should not be surprised that building a physical infrastructure large enough to put all students in face to face courses in simply not possible. A review of articles in the *Chronicle of Higher Education* or *Inside Higher Education* will quickly reveal that universities across the country are experiencing the same phenomenon. Therefore UCF, like other universities, offers classes in multiple modalities—several of which you will most likely experience in your graduate studies (Online@UCF.edu). Some of these include:

    a. **Face to Face Courses:** On the surface these appear to be the traditional classes. However, as graduate students both taking and teaching, of course, you will find that most of these classes are augmented with multiple instructional technologies: learning management systems, social networking, worldwide resources, and instant electronic communication. In contemporary higher education face to face classes extend far beyond the walls of the classroom (C. Dziuban, Hartman, Moskal, Sorg, & Truman, 2004).
    b. **Fully Online Courses:** Usually online course with no physical presence feature extensive use of learning management systems such as Blackboard, Canvas or Moodle. The online modality continues to grow across the country and you may experience this in your graduate work. In fact it would be in your best interests to seek out courses of this modality (e.g., https://online.ucf.edu/) because many universities when interviewing for new faculty positions favor candidates who have some experience teaching online (C. D. Dziuban, Picciano, Graham, & Moskal, 2015; Means, Bakia, & Murphy, 2014)
    c. **Blended Course:** This highly adopted mode combines face to face and online leaning. In several studies blended courses have produced higher success rates than either face

to face or fully online courses. Teaching in this modality requires a special talent by being able to optimize the learning potential of classroom with electronic learning (C. D. Dziuban et al., 2015; Stein & Graham, 2014)

In addition to these three basic modalities, many new approaches to formulating a classes are appearing in higher education: lecture capture (Euzent, Martin, Moskal, & Moskal, 2011), virtual environment such as second life (de Noyelles, Hornik, & Johnson, 2014), massive open online courses (MOOCS) (Bonk, Lee, Reeves, & Reynolds, 2015), social networks and twitter (Levinson, 2010; McCool, 2011) and many others. As you progress through your graduate programs varying course modalities will become increasingly important.

5. **Interdiciplinary Graduate Education:** The interdisciplinary graduate degree is becoming popular (North Carolina State is an interesting model), moving towards a trend in higher education (National Research Council, 2014) where societal and scientific problems will be solved on the interfaces of disciplines. For those who gravitate to this, they are in high demand (in particular, cluster hires nationally are looking for these types).

RECOMMENDATIONS

We've outlined a number of challenges and opportunities, and now we will provide advice. We encourage you to take it if you have not already heeded these suggestions from others.

1. **Roadmap Your Future:** As we say, "skate to where the puck is going to be, not where it is today." In doing this, don't forget to think about the process. Graduate school may sound great in theory but be impractical in practice (e.g., challenge number 1—graduate school is not cheap). If you are wise in roadmapping your future, potential barriers to pursuing and completing a graduate degree will be taken into account and will more likely be overcome. Look at job advertisements and position descriptions in both academia and industry. It's very important to position yourself with these at the start of graduate programs. For example, when you have electives perhaps you take specialized classes in emerging areas. Get summer internship experience if at all possible to experience the non-academic environment. This is probably one of the most beneficial experiences you can possible have—you will either find out that it is not for you (which is great to find out during an internship than in your first job) or that it is a great fit for you which focuses your post graduate job search towards industry. The third author did two summers at a NASA Center and one summer at Boeing Space and Defense and learned that her brain is not 8-5—impossible to turn it off to run catch the carpool home. Her brain is better suited for a 24/7 type of flexible role that the academy nurtures.
2. **Find a Mentor and be a Good Mentee:** Research suggests that productive mentoring and advising is important and can predict, for example, later research productivity and research self-efficacy (Paglis, Green, & Bauer, 2006). If you are currently a graduate student, it is very likely that you already have been assigned a mentor, and if you find yourself in that situation, we applaud your program for doing so. Even if you have an assigned mentor, you may want to find another mentor—perhaps someone outside of your program, department, college, or even university. It may be that one mentor is your academic mentor, offering discipline and career specific coaching. You may have another mentor that assists you in keeping balance in your life. Another mentor may be an excellent resource for providing

that neutral external perspective. In our experience, it's just not possible to have too much mentoring. Multiple perspectives are enlightening, and mentors are a great sounding board for recommendation #3. Keep in mind that you also have responsibility in this relationship. As a mentee, seek advice and guidance from your mentor (i.e., don't set around and wait for them to come to you) (which leads to our next point). At the same time, be respectful of this relationship and time that your mentor is devoting to your relationship (i.e., don't expect your mentor to carve out several hours a day and serve as your personal life coach). Additionally and unfortunately, not all mentoring relationships are productive, and this is supported by research (e.g., Feldon, Maher, Hurst, & Timmerman, 2015). We are not suggesting that you assume your mentoring relationship should be anything but productive. What we *are* encouraging is a proactive approach to your mentoring relationships (e.g., seeking additional mentors to allow for broader and different perspectives and holding up your end of the mentor-mentee relationships).

3. **Ask Questions:** Take this as extremely broad advice. Ask questions about everything: course content, careers, navigating graduate school, and more. You are not assumed to be an expert in graduate school so questions are actually expected (really!). Ask them, even those questions that may truly reveal you really know almost nothing about the subject that you think you probably should know more about. You are a graduate student, and you are entitled *not* to know the answer. Take advantage of that. Keep in mind that once you attain your graduate degree, there is often the perception that *you* are now the expert, able to answer all those questions that you have just been asking. Thus, before you cross that line, ask questions—many and often. Be *that student* that has just one more question.
4. **Network**: This recommendation shares qualities of points number 2 (i.e., guidance from others) and number 3 (asking questions), but it is unique enough that we felt it needed to stand alone. To network as a graduate student is to form a web of individuals that can help you further the journey that you've roadmapped (remember number 1?). In our experience, the most successful graduate students have a network that spans peers, faculty, staff, and administrators, and individuals outside the institution that are in, as well as outside, the areas that were roadmapped. From our experience, it's both what you know *and* who you know. We are not suggesting the good old boy network lives on. Rather, we are suggesting that you are responsible for making the connections needed to get follow the puck to where it is going (remember number 1?).
5. **Be Thoughtful in your Choices:** Understand the consequences of your actions, reactions, and non-actions, and consider what that means for you and your ultimate roadmap (remember number 1?). Remember that the long-term gain may be worth the short-term headache. For example, completing a few more classes that are outside what's required may allow you to earn a certificate degree or additional master's degree that makes you more attractive in the job market. Becoming a team member on an unfunded research project may give you co-authorship on a cutting-edge published study that brings recognition to you and your research. On the flip side, there may be opportunities that don't help you get to where you want to be. When in doubt, and even if you are confident in your choice, talk to individuals that can provide constructive guidance (remember number 3?), and you know who to ask (remember number 2?).
6. **Expect to Work Hard:** There are multiple reasons that such a small percentage of individuals hold advanced degrees, one of which is that it's not easy. It shouldn't be. Graduate education is not an entitlement. Your graduate classes should make you think and think deeply. The best classes are those from which you depart both mentally exhausted and intellectually stimulated. Understanding the expectations of your program, department, college, and

institution upfront will at least make the journey more transparent so that you know what you're getting into.

SUMMARY

Graduate education is influenced by "political, economic, social, technological, and demographic trends and events" (National Science Foundation, 2015, p. ii). These materialize into challenges and opportunities for graduate students. We believe the latter (opportunities) outweigh the former (challenges), particularly if you are deliberate in your roadmap, relentless in your quest to be informed, are wise enough to know what you don't know and ask questions (lots of questions) until you know the things that were, simply, not on your horizon.[1]

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