The PhD Journey: Evolving as a Researcher

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I have found that many PhD aspirants do not know what a PhD means or why they want to get a PhD in the first place[1]. Some start on the PhD journey because they would like to be addressed as "Dr. So and So" acquiring prestige in the eyes of society. Some join a PhD program because they do not want to deal with the boredom or stress inherent in corporate careers. They think an academic career may be comparatively less stressful. Some may want to take a break in their careers whereby they are able to give more time to their families. Some PhD applicants are individuals who have already started teaching as a lecturer in a college, or as a researcher in a research organization. They may consider the PhD as the logical next step in their professional journey. However, while they may envision the final outcome, they may not know what is expected of them during the years of study. Undertaking to do a PhD is a serious step, and the journey can be quite challenging. The decision should be taken after considering what it really means in terms of time, labor and possible heartache.

Individual students and advisors in different departments may have different notions of the PhD journey. In this document, I am putting down my own ideas about what the PhD degree implies in terms of acquisition of skills and knowledge, and my expectations from my own PhD students. I often talk about these expectations with my research students in one on one meetings. However, despite frequent and lengthy repetitions, sometimes I fail to get through. This leads to my expectations not being met and the students feeling frustrated when their thesis does not seem to be progressing as they hoped it would. I am putting my thoughts down on paper to provide a guideline to potential students as well as existing students that they may refer to from time to time. While this document is addressed primarily to the research students in the IME department, if it helps other students or teachers, I will be glad to have been on some use.

What does the PhD degree denote?

"A PhD is the highest level of degree a student can attain - it demonstrates that you've made a ***meaningful new contribution*** to your chosen research field.[2]" According to the American Psychological Association, the PhD is "intended for students interested in generating new knowledge through scientific research (i.e., setting up experiments, collecting data, applying statistical and analytical techniques) and/or gaining teaching experience."

[1] This includes me when I started on my PhD ☺

[2] https://www.prospects.ac.uk/postgraduate-study/phd-study/what-is-a-phd

Note that the PhD degree is different from structured educational programs such as Bachelor's and Master's programs. A bachelor's or master's program has a well thought out curriculum that is highly structured. You are expected to take courses, attend lectures, do the assigned reading and *imbibe existing knowledge* in a particular subject. There is also a regular feedback system in place in terms of exams and grades that tell you how well you have understood a particular subject or whether you have acquired certain skills.

Difficulties that PhD students may face:

In the PhD program, you have to not just imbibe the knowledge that is out there but you also have to *contribute to existing knowledge*. Further, there is no regular feedback that tells you how well you are doing as you go along.

The following aspects make the PhD journey somewhat daunting to new students:

- Novelty - The need to do something that is new
  - How do you know that what you are attempting is new and has not been attempted before?
  - How do you think of new ideas? Surely others have figured out all the important angles to a particular problem? As you wade through oceans of literature, that is what it looks like.
  - The culture of not "thinking for yourself" but "learning what our teachers tell us" that pervades our educational system. This leads to students not having the training or the confidence to be able to critically evaluate existing knowledge.
- Ambiguity and uncertainty
  - Will you be able to get good data related to the problem?
  - Will you get good results that confirm (or reject) your original hypotheses?
  - How will your idea will be received by the research community?
  - Will you be able to publish your thesis work as journal publications?
- Lack of writing skills
  - This is one area where most students find the greatest difficulty.
  - Most students are able to collect data, many are able to analyze the data, but when it comes to writing up the results and tie it back to the literature, and producing a scholarly article, most students flounder and are unable to do so even after getting their PhD.
  - Some students are not fluent with English having studied in vernacular language medium schools. Even those that have studied in English medium schools and can speak fluently are not able to write. Our educational system does not teach students to write original essays. Multiple choice answers or short answers with keywords get marks.
  - Technical writing has its own rules that are quite strictly followed and these have to be learnt.

- Training students to write well seems like an unsurmountable difficulty, and is commonly regarded as the most difficult part of guiding PhD students. Sometimes advisors end up helping their students in the writing extensively. This is not good for the advisors because it takes up too much time and is exhausting. Neither is it good for students because they do not learn how to write and communicate their ideas effectively. They are not properly trained for a career in research – and should not be granted a PhD.

- Time horizon – lack of structured schedules / lack of time management skills
  - How long will it take you to do all the work that is required?
  - Research is typically not bound by a set schedule – there are no interim deadlines.
  - Many people procrastinate when they do not have actual deadlines to work towards[3]. For most of us, it is difficult to be self-motivated and disciplined on a regular basis.
  - Not considering the opportunity cost of an additional year in the PhD[4]

Good news – it is possible to tackle the difficulties

- Novelty – after reading the literature extensively, and think critically about possible research gaps, you will be able to identify new problems
- Ambiguity – your advisor can help you tackle some of the ambiguity by guiding you in a better direction – however it is not possible to remove all ambiguity while doing research.
- Lack of English Writing Skills – this can be amended by taking online writing classes – a very good resource is: Purdue Online Writing Lab: https://owl.purdue.edu/owl/purdue_owl.html. The only way you can improve your writing is by practicing more and more.
- Time Horizon: The way to tackle this is by working backwards from the day you want to finish your thesis and setting up your own deadlines – I will share a possible timeline at the end of this document.

[3] It is easy to take things easy at the beginning of the PhD journey – to indulge in hobbies and time wasting activities and just let the time pass till the fourth year comes around and you start panicking because you have not done anything meaningful and you can see the clock ticking when your scholarship will run out.

[4] Opportunity Cost: I am going to outline the opportunity cost of each additional year that you spend in your PhD. Let us assume that you will get a salary of Rs. 12 lakhs per annum when you graduate (it might be more or less but I am taking an average figure). Suppose you graduate after 6 years instead of 5 years, your total number of years of earning a salary post PhD goes down by one year. This money compounded over a lifetime of say 30 years (post PhD) at a inflation adjusted savings rate of 3% pa is Rs. 29 lakhs (in today's money). If the inflation adjusted savings rate is higher (say 4% pa), then the opportunity cost of a year's delay is Rs. 39 lakhs. That is about Rs. 10,000 per day. So when you do not work on your thesis on a given day, think of it as losing Rs. 10,000 that day. Note that I have taken the starting salary and not the median lifetime salary which will be higher.

Expectations

I am going to outline below my expectations for PhD students to be considered eligible for a PhD degree.

Knowledge, understanding and thinking: You have to evolve as a knowledgeable and an original thinker in your chosen field. In order to do so, you will need

- To know the vast majority of the literature in your field at sufficient detail
- To be able to synthesize the findings in the literature[5]
- To be familiar with the contributions of seminal authors in your field
- To be able to think independently and critically about the literature

Analytical skills:

- To acquire a very good understanding of the basics of statistical analysis including hypothesis test, regression analysis, multivariate techniques such as factor analysis, SEM and other tools
- Learn how to code in R / Python / other software

Communication skills:

- To be able to communicate your ideas in crisp, grammatically correct English
- To be able to follow the author guidelines for conferences / journals and produce articles within a specified word length
- To be able to stand up in front of a group of your peers and defend your ideas[6] - this includes giving research seminars in the department as well as in conferences

Responsible and Ethical Behavior:

- Honesty and truthfulness – this includes not lying while collecting data / not plagiarizing, not using others to do your work for you, not stealing other's work, not lying about personal circumstances etc.
- Not harming others – not harming / bullying anyone, not stealing credit, no sexual harassment
- Taking responsibility for your own actions – acting like an adult and not giving excuses

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[5] This means have a bird's eye-view of the entire literature - what are the main theories? What are the main empirical methods used? What are the connections made between different theoretical and methodological papers? Can you summarize the literature and explain it in easy language to a lay person?

[6] Remember that reviewers of your thesis or your papers will not be friendly (quite the opposite) and will challenge your hypotheses, your methodology, your data, your analysis, your conclusions and the actual significance of your work for the field. When someone quizzes you on what you did and why you did it, you cannot say I did this because my supervisor asked me to, you have to be convinced of the methodology on your own and defend the thesis on your own. Because finally it is your work and not your supervisor's work that you are defending.

Role of an Advisor / Supervisor

The primary role of a thesis guide is to be a mentor and a person who keeps the topic and the progress of the thesis within certain manageable bounds. I am outlining below my envisioned role as a supervisor:

1. Helping students choose a suitable research area and thesis topic based on student's and my interests
2. Meeting students regularly (weekly / fortnightly) to keep track of progress
3. Guiding students towards appropriate literature
4. Provide feedback about progress on a regular basis (including meeting with DMC every six months)[7]
5. Help students design the study and identify the appropriate methodology
6. Help students to understand and refine the statistical analysis of your data
7. Provide feedback on reports / articles
8. Greater support will be provided for editing the first draft, and progressively less support in latter drafts
9. However, the responsibility of providing a reasonable thesis draft lies on the student and not the advisor.
10. Identifying appropriate examiners for the thesis

A Possible Time-line of Research

1st year: Take courses / choice of advisor

2nd year – Choice of topic / Comprehensive exam / SOTA / take a writing course (really recommended)

3rd year –4th year: The main part of the research (research leading to three or four chapters for your thesis)[8]

5th year – Put together the thesis draft, open seminar and submission

These timelines are just indicative, different advisors may have different goals for their students.

Wish you all the best as you embark on this remarkable journey that may be difficult but will transform your lives as a researcher and independent thinker. I am also providing a link to an excellent document written by Economics Professor Don Davis at Columbia University:

http://www.columbia.edu/~drd28/Thesis%20Research.pdf

[7] One way of giving regular feedback is to set up expectations for progress through the semester and give informal grades on the state of progress through the semester to the student (through weekly meetings). Deliverables and reports are expected at each of these meetings. If such deliverables are not met consistently, then an unsatisfactory grade will be given. Accumulating several such unsatisfactory grades will result in getting X grades at the end of the semester.

[8] Within these timelines, it may be beneficial for you to target some conferences and submit some of your early chapters to journals. Having one or more accepted papers really improves the chances of your thesis going through the examiner's assessment and also the chances of you getting an academic job (postdoc / faculty) after your PhD. Writing a research paper requires a greater degree of rigor and sophistication, which needs to be mastered by the research student.