13 Q&As for PhD Starters : What PhD Candidates Should Know

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Q1: **What should I care about most at the beginning of my PhD study?**

A1: You should concern about *time management* first. Basically, thee years are given for your PhD study (You can reduce it to two years or two and a half years if you want.). It may seem long enough at the beginning, however, it would be a blink of an eye unless you carefully manage your time in a very strategic way.

Q2: **What is the meaning of 'getting a PhD'?**

A2: You should *neither underestimate nor overestimate* the meaning of PhD study. This is suggested by Derek Salman Pugh and Estelle M. Phillip, the authors of an interesting as well as practical book, 'How to Get a PhD', which I completely agree to. If you think that just binding some of your already written academic papers or technical reports, or just describing what you experienced or what you did previously can give you a PhD degree, you are doubtlessly underestimating the meaning of it. A PhD study must be, I believe, a consistent and original new world (even a small world). It should be beautifully organized as a *structure* such as 'Angkor Wat', which transmits strong feeling and intellectual emotion to the visitors.

In addition, we must think about what we expect from individuals with PhDs. We do not anticipate them to be super beings even in their fields. Common and general images of PhD holders may be as follows: those who accomplished at least a definite research work; those who know how to study or how to tackle research work; those who have the ability to plan and manage different kinds of resources for an intellectual project in due time. In this sense, 'getting a PhD' is not a goal at all but the commencement of a full-scale activity for a self-manageable researcher or a study-oriented practitioner. This means that PhD study is not necessarily required to be *great* or *nova* like 'the theory of relativity,' rather a PhD may just be *an important part* of a grand research project. A sense of balance between underestimation and overestimation is one of the required qualifications for PhD candidates.

Q3: **What should I start with for my PhD?**

A3: Three years of PhD tackling is neither always flat nor pleasurable. It is more likely an adventurous footpath with unknown obstacles. You may often encounter innumerable hazards like steep rocky walls, rapid rivers, ferocious beasts or attackers

and sometimes even phantoms. Three years walking through this thorny path may seem very harsh thus so long although I mentioned it is very short before. Now, you need a survival strategy to reach the end within the given time. Let's suppose you are a mountain climber and your way is blocked by unexpected stiff wall. Retreating can be an option, but often more difficult. What do you think and how do you feel? You may feel enclosed by problems and troubles with no way out!

On the contrary, however, you can be thrilled by the challenges you are facing. If you are somewhat enjoying the challenges at all, it will be helpful in keeping your spirit and survive it. You can find fun and even enchantment through attacking the obstacles. PhD study is, again, like a mountain climbing. It is wiser to *choose a mountain you like*. And design a route as to attract you. Finally, you should, at least, believe that you like the mountain and route you have chosen, otherwise, you would easily feel like to give up whenever hardship afflicts you.

Same thing can be said in approach of your study. Some like mathematics, some do outdoors, and some do experiments. Some are enthusiastic in seeking for real facts, while some for theoretical mechanisms. You should *know yourself* before start; in what field or problem and in what kind of study approach can you keep *your enthusiasm*? Reading papers or reports extensively, and observing reality with your own eyes and feet will be helpful to know yourself.

Q4: **What do I seek for in your PhD study?**

A4: Roughly speaking I think there are two types of PhD studies in terms of the orientation of researchers: *a practical contribution* and *an academic contribution*. Your study must belong to one of them at least.

In the former type, you must survey what problems or needs the practical world faces, or more importantly, you must foresee what will face in the future. Then, you must imagine and identify what facts, concepts, methodologies, or ideas you can provide for the practical solution through the PhD study. You do not always have to consider the practical needs at present too much, but sometimes, people may not understand the importance of your study right away. Cellular phone is the one of the examples. Few people could imagine that cellular phones would become one of the everyday necessities when it was invented. Even if the practicability of your study is not well understood by others, you yourself at least must be confident and enthusiastic about the use of your study as far as you decide to allocate your study in a practical field. Your study must be basically realistic and use-oriented (practically meaningful and useful).

If you wish to seek for the academic significance (the latter type) in your study, you have to know at the beginning who are studying what (even if they are useless) in the world up to now and you have to always update it. Your world is mainly in major academic journals. You may try to provide theories with new ideas (ex. game theory, discrete choice model), to improve methodologies (ex. genetic algorithm), to solve a difficult academic problem (ex. solving $a^p+b^p=c^p$), to discover new facts (ex. archeological excavations, folklore survey in ethnic villages), and etc. Some may result in practical contribution, but not always. For example, 'discrete choice model' is well used in practice, while 'game theory' is interesting but little used in the practical world. For this type of study, I request it to be at least really new and intellectually very *interesting*. When an academic study can provide some results which cannot be anticipated by the simple intuition or commonsense (ex. the theory of complexity), or when a never-solved difficult problem is overcome by a unique idea, it is worth to try.

A study both practically and academically meaningful is, needless to say, the best. In reality, however, many studies are neither very practical nor very academically interesting. My advice here is that "Chasing two rabbits brings none."

Q5: **What criteria should my PhD thesis satisfy?**

A5: People in non-research field often ask me, "How many pages are required in PhD thesis?" It is a silly question, but I answer, "As thin as possible, as far as it sufficiently contains necessary requirements." Then, what are the necessary requirements? Now, you have a "question" that makes more sense. *Originality* is the first virtue of research. This means you need *something new* or *something different* from others' in terms of either among field, topic, concept, theory, method, algorithm, application, survey, experiment, result, etc.. Of course all parts of your study from all viewpoints are not necessarily to be original. It is not very difficult to find originality to some extend in a study. The levels of originality, however, differ very much according to studies. Of course, the more original, the better. You must be always sensitive to this question; what originalities can I claim in my study? You should recheck if your study is really original.

The second but more important component, I believe, is *significant contribution* of your study. Even when you have originality, it cannot be a PhD thesis, if it does not contribute in practical or academic way. On the contrary, I cannot imagine a significantly contributing study without any originality. Originality follows naturally and necessarily a significantly contributing study. Therefore, I suggest you should

consider how the study contributes in practical or academic meanings prior to the originality of the study.

Still, it is very difficult to show a criterion measuring the significance of contribution. The contribution of a study may basically be appraised in *qualit*ative rather than quantitative. However, it is true that quantity also matters in terms of contribution. For example, most of empirical studies, which usually require surveys, experiments, or data collections, may not be established without large amount of time and efforts being paid, while pure theoretical studies can be established shortly if you are talented and lucky enough. Historical study highly requires time and efforts at most as far as I know. It can be concluded that quantity is also a factor more or less to be referred. Regarding the significance of contribution, the most important thing, I think, is that PhD candidates are deeply confident on that their studies are contributing anyhow.

Q6: **What are the differences of PhD's, Master's, and undergraduate's theses?**

A6: PhDs, Masters, and Undergraduates, all are required to accomplish their theses, but the time spending and level of contribution in both of qualitative and quantitative are different. Especially, required abilities, which I think the most important, are the largest difference.

Regarding research projects, I think the following four steps are required in order: 1) project finding and building; 2) project planning and management in a strategic or global level; 3) project planning and management in a tactical or local level; and 4) project implementation. This process is of course not only 'one way' direction. The steps to downward must be frequently and adequately reflected to upward in order to examine and to modify the previous steps appropriately.

The requiring ability for the undergraduate candidates is, at least the ability of implementation, the fourth step. It is desirable for them to achieve the ability of the third step, project planning and management in tactical or local level during their theses study. Advisors will complement the upper steps needed for the research project. Master candidates are expected to have abilities to complete the third and fourth steps by themselves, and supposed to be trained for the second step, ability for project planning and management in strategic or global level, though it is easy at all.

PhD candidates are expected to have abilities to perform the second, third, and fourth steps by themselves, and to acquire the ability of project finding and building, the first step, doubtlessly the most difficult. When you mastered all the process, you can be an advisor. Therefore, the answer to the question is the dependency on your advisor.

As a matter of fact, I will basically not be the first author in journal papers studied with PhD candidates. You may be suggested or commented from your advisor, however, you should not rely on him/her too much for giving you answers or making decisions in decisive matters. Otherwise, you can never master the abilities related to the first and second steps. Don't forget that you yourself are the main actor in your study.

Q7: **What kinds of way of thinking are required to PhD candidates?**

A7: There is no definite answer to this question, since it highly depends on personalities and cases. Here, however, I would like to give my personal suggestion as follows.

Keep *strong passion and enthusiasm* (or sometimes 'social or public anger') on your study. It will be the basic inner-force to drive you to discover new things, improve weak points, and develop your thoughts.

Be *logical* and *systematical*. PhD study is like building a structure consisted of many related parts. Every assembly must be logically and coherently connected. A weak joint can cause the whole structure to collapse. If parts consisting the whole are not systematically designed and organized, what you built may turn out to be just an agglomeration of junks rather that a meaningful "structure." You should be very sensitive to your logic and system.

Take care of *every detail* of your structure. It is often said, "God dwells in the detail." In this sense you need *eyes of an ant* so that you can see the microscopic detail. At the same time, you must never forget to make the whole structure well harmonized. For this, you need also *eyes of a bird* so that you can see the macroscopic overview. Imagine a painter drawing a picture. He stands just in front of his easel and canvas for drawing the detail, while he often walks back in order to see the picture as a whole. You must watch your study as a bird and as an ant at the same time.

Keep yourself *critical* to your own study by trying to find 'possible problems' in advance before they become actual and fatal. Problems sometimes can be seeds for a new creation, but you shouldn't leave them as they are. You must always be *constructive* to find ways to *avoid problems and overcome them, if any.* Do not forget that you are going to get a PhD in engineering. One of the greatest virtues of engineers is, I believe, the mind to find a feasible and reasonable solution promptly to any problems at any situation. Always be *critical and constructive*. To be critical and constructive, the following questions may be helpful to be asked to yourself repeatedly: Is it correct? Is it verified? Can it be justified? Is it the best way? Isn't there any other way? Why so? So what?

Q8: **How should I spend my PhD period?**

A8: It depends. Nevertheless, the most likely case will be as follows:

1st year:

This year is the beginning, a ‘preparatory stage’, but it would be the most important time when you look back after three years. The target of this year will be to brush-up your idea and build a “study plan” based on the idea. To accomplish it, you need to make your interest more focused, perform the preliminary field observation, interview the specialists in the world of practice, review intensive journals, and discuss many times with your advisor and colleagues. You can use the opportunities of given discussion activities, such as Research Working Group meetings (RWGs), and Deep Discussion Meetings (DDMs) in the laboratory, as well as personal meetings with your advisor.

The planning step is the most difficult in the whole process. You are given so many troubles to overcome and a number of choices to select, but you may be frustrated or unstable among them. Yet, don’t worry. It is common adversity given to all PhD candidates. If they have survived through the ‘narrow gate’, then why can’t you? The key of this stage will be this; the more you think, observe, experience, read, and discuss, the better plan you will make.

Knowing about the activities and the achievements of your advisor and the laboratory is recommendable in your early stage. You can refer the list and copies of all of my papers and articles at my office. Basic learning for your topic should also be done in this stage.

2nd year:

In the late first year or in the early second year, your ‘study plan’ should be finalized, and you should start full-scale works of the study. In the middle of the second year, you need to pass ‘the Interim Qualification’ held by the department to decide whether the continuation of the PhD study and the scholarship (if provided). You are requested to explain your “study plan” and your “temporary achievement”, and to make professors of the department convinced of the value of your study and your *ability of study* through the discussion with them. Your co-advisors (referees, usually five professors including your main advisor) are nominated at this moment.

You are likely to modify your ‘study plan’, namely, your hypotheses, methodologies, and program, by reflecting the results and the experiences of your full-scale works that are partly finished. You are expected to submit a refereed paper (of

course on your PhD topic) to journals (ex. JSCE journal) or to established conference proceedings.

3rd year:

In the former half of the year, you may have to finish all the main and critical, time consuming and labor intensive works with strict constraints. Since unexpected problems or additionally required works often occur in the near-last stage, it is quite recommendable to save time in advance.

You should edit the final draft of the thesis at this point. (It is much better to write and prepare the parts of the thesis draft little by little from an early stage.) When you accomplish the most part of the thesis, you should visit co-advisors personally and get their comments and suggestions, which will be reflected in the final thesis. It is strongly recommended that you have some refereed papers (published in journals) covering some parts of the thesis. Frequent and deep discussions with your advisor are important as same as in the early stage in order to find the best way to settle all of your works in due place.

Around two-month-before the graduation, you will be at 'Final Presentation and Defense'. Passing it successfully, you will get a PhD degree at the commencement. It must be noted that university rule request you to publish the outcome of your study after getting PhD degree. Therefore you are likely to submit three or four refereed papers to journals in total, including the papers published before the dissertation.

Q9: **What do reviewing and other preparatory works aim at?**

A9: As mentioned in A8, when you roughly chose your field, your next job is the extensive and intensive preparatory work. All these works are just for 'study plan'. This shows the importance of building 'study plan'.

The missions of all preparatory work such as journal review, field observation, interviews to specialists, brain storming, will not be single but quite as multiple as follows: 1) finding practical *needs and problems*, 2) knowing *orientation and prospect* of policies at present and in the future, 3) understanding *academic state of the art*: what's done and achieved, what's popular and what's not been tried, 4) getting *inspirations and ideas* from various sources, 5) discovering applicable *methodologies*, 6) enriching your *feeling and images* about the actual situation with your own feet and eyes, 7) developing your ability of *intuition* by touching the reality and by learning the existing studies, 8) developing, modifying and brushing up your ideas and thoughts through discussion, 9) building hypotheses and images of your thesis, 10) convincing

yourself of your study…etc..

Q10: **How do I build and implement my PhD 'study plan'?**

A10: I believe that designing and managing 'study plan' is like *a project of expedition amongst a great mountain*. Suppose you are the leader of an expedition project. First of all, you must decide your target peak. Perhaps you may ask yourself why this peak why not the others? You should find some rational of your target so as to make your expedition project justifiable. You must also check if your target is already conquered. If it is already conquered, you have to find another way to conquer, a more meaningful way, otherwise, you have to find another peak.

Then, you must identify the location of the target; now you need a map. If there is no good map, you have to start from map making. (It tells us something that climbing Himalaya was first started by British surveyors.) You must carefully mark all the possible critical points in the map and design the appropriate route from a starting point to the peak. You must forecast the possible risks and design countermeasures against them. Did you list up all equipments and materials required for the mountain-climbing, and design the logistics (procurement, transportation and stock management of all resources)? Suitable time-scale programming in a short season between Monsoons and contingency plan is also critical. After all these factors are repeatedly and reciprocally checked, you can finally build a feasible proposal of your expedition plan. Leaders of expedition projects must be *bold and perfectly careful*. Good planning usually takes much longer time than the expedition itself. Now, you may explain it to your sponsors, and if your plan is accepted and financed, you can step up to the next stage.

You must study and determine the details of your expedition plan. The first thing to do is composing the expedition team. Not only exquisite climbing experts, but many kinds of specialists should be included, such as porters, medical staff, meteorologists, telecommunication technicians, cooks…etc. Since it is not pragmatic and realistic to decide every detail in advance in your office, your plan must have more or less room of flexibility. With all the discussion of every detail at the table, it is unavoidable to run across unknown factors or uncertainties. You have to learn how to deal with them and often you will need to modify the original plan to make it more implementable.

You will surely face many troubles: failure in food logistics, sabotage of porters, height sickness…etc. You may suffer from severer misfortunes such as a sudden weather change and an accident. You often need to hire experts in order to avoid unnecessary risks and to prepare for the uncertain factors as much as possible. You may

often have to modify your original expedition plan; change in climbing route, change in the arrangement of brigade members, change in logistics, and sometimes retreat. You have to be flexible and broad-minded enough to keep your fundamental mission to be done.

In practical world of civil engineering, it is often said that “Preparation contributes to 90% of your success.” I am completely with the idea, but 90% is exaggerated number in expeditions or in research projects, because there are so many unexpected factors, which could be a good challenge. Still 50% is effective for the contribution of “planning” for the success. Thus, it is very worth while to struggle for building a good “study plan” to your best..

Q11: **What should I prepare for the Interim Qualification?**

A11: What will be the requirement of the Interim Qualification? It expects an explanation on your “study plan” and the achievement up to that time. Regarding the “study plan”, key points will be the significance in contribution, the originality (as mentioned before), and the *feasibility*. You can be as ambitious as you can achieve within your time limit. If your study plan excesses the feasibility, you will fail to pass the Interim Qualification.

Your academic abilities and engineering aspects are also tested through the discussion at the Interim Qualification. You are required to have the confidence on what you are doing, the flexibility on suggestions, the enthusiasm on your topic, and communication and discussion skills. To prove all of these, presentation skill will be a very influential factor.

Q12: **What are the in-house Milestones before the Interim Qualification?**

A12: It’s not officially required, however, the following in-house Milestones before the official interim qualification (one and half years after the beginning) are recommended to be set up in your lab: 1) ‘*Inception Report’* around six month after you start PhD program; covering your interest, the (practical) problems, your motivation, state of the art, targets of your study, and temporary draft of your study plan. 2) ‘*Draft Report on Study Plan’* by the end of the first year; being deeply discussed repeatedly, and full-scale work start with a temporary authorization. 3) ‘*Interim Report on Study Plan and Provisional Outcome*’; preparing for the official ‘Interim Qualification’.

Q13: **How can my study period be reduced?**

A13: You can reduce the period by half or up to one year (same to the Master Course).

If you wish to apply for this, you have to fill the form for the reduction at the department before the Interim Qualification. According to the guideline of the university, outcome of PhD studies in the reduced period are requested to be “much more excellent than the average” (for the Masters, “excellent than the average”). It is also requested to add two referees more from the departments other than that you belong to. The reduction may be profitable from the viewpoint of productive use of time and of job-hunting opportunities, however, may not be always effective in tackling the topic deliberately with time. Therefore, I personally neither encourage nor discourage the reduction. The decision is completely up to you.

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