

Research Application Summary

Path to the PhD in Plant Breeding and Biotechnology at Makerere University

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Abstract

There are many myths and realities associated with the PhD journey. It also comes with a lot of challenges, however, these are surmountable. Some of these challenges include the race against time, problems both from the part of supervisors and students themselves, the fact that the journey could be a 'lonely' one, and that the nature of PhD research itself is challenging. Notwithstanding these myriad of challenges, many have completed the journey within the three years minimum period required in most institutions. Being clear about the research topic and starting the PhD research early, having sponsorship (funding), not seeing it as an 'ivory tower', understanding the nature of PhD by both not underestimating and overestimating what is required, not losing contact with supervisors at any point in the journey, not taking a job before finishing the PhD, and 'wanting' a PhD with a purpose but not just for the sake of it, are key to overcoming these challenges. It is important for PhD students to realize that it takes more than brilliance to successfully reach the end of the 'PhD journey', and that it also needs determination and application. Also, the role of the supervisor should not be seen as simple, but, as a complex professional one, which requires much more than good will and spare time.

Key words: Determination, doctoral student, 'ivory tower', research, funding, supervisor

Résumé

Il y a beaucoup de mythes et des réalités associés à l'expérience des études doctorales. L'expérience s'en va également avec beaucoup de défis, mais ceux-ci sont surmontables. Certains de ces défis comprennent la course contre la montre, les problèmes issus à la fois de la part des superviseurs et des étudiants eux-mêmes, le fait que l'expérience pourrait être « remplie de solitude », et que la nature de la recherche de doctorat elle-même est difficile. En dépit de cette myriade de défis, beaucoup ont accompli le voyage au doctorat dans le délai minimum requis de trois ans dans la plupart des institutions. Etre clair sur le sujet de la recherche et commencer tôt la recherche de doctorat, avoir le financement, ne pas considérer l'université comme une « tour d'ivoire », comprendre la nature des études

doctorales ; ne pas sous-estimer ou surestimer ce qui est nécessaire, ne pas perdre le contact avec les superviseurs à un moment donné des études, ne pas s'embaucher avant de terminer le doctorat, et «vouloir» un doctorat avec un but, pas seulement pour le plaisir de le faire, sont des éléments essentiels pour surmonter ces défis. Il est important pour les étudiants de doctorat de se rendre compte que ça prend plus de brillance pour réussir à atteindre la fin du «voyage de doctorat», et que ça demande aussi la détermination et l'assiduité. En outre, le rôle du superviseur ne doit pas être considéré comme étant simple, mais plutôt comme un complexe professionnel qui exige beaucoup plus que la bonne volonté et du temps libre.

Mots clés: Détermination, étudiant au doctorat, «tour d'ivoire», la recherche, le financement, le superviseur

Background

The PhD (Plant Breeding and Biotechnology) programme hosted by Makerere University in Kampala, Uganda, was developed to produce scientists who meet the human resource needs of the public and private sector through crop improvement and related disciplines, and train and lead scientific development agenda of their countries. It is one of the few PhD programmes in Africa which comprise both taught courses and research, and requiring a minimum of 3 years to complete. The programme was developed as a centre of leadership through the auspices of the Regional Universities Forum for Capacity Building in Agriculture (RUFORUM), a network of 60 universities in Africa. Using the centres of leadership approach, one or more than one member university of the network hosts postgraduate training and research programme on behalf of the network (Osiru *et al.*, 2016). For the Plant Breeding and Biotechnology programme, Makerere University takes leadership in its implementation by providing the training facilities and hosting the academic programme while the RUFORUM Secretariat provide oversight, broker links with strategic partners with unique contributions to the programme, and perform roles of quality assurance, advocacy, resource mobilization and coordination at the regional level. To date the programme has trained more than 40 PhD centres, and this year has been designated by the World Bank as an African Higher Education Centre of Excellence in Plant Breeding for Eastern and Southern Africa.

This paper describes the experiences and thoughts of the author, as a beneficiary of the PhD training programme in Plant Breeding at Makerere University.

Literature summary

There are many beliefs associated with PhD training, some, of which may be mere figments of imaginations, while others are realities, what Phillips and Pugh (2005) refer to as the “Myths and realities of the system”, in their book ‘How to Get a PhD’. Some of these include the fact that PhD research is expensive, not possible to complete within the three years minimum period, and others. These beliefs stem from the fact that some of the PhD programmes (such as the Plant Breeding and Biotechnology at Makerere University) require a full academic year of students taking taught courses; the fact that in most cases, the research component requires field trials which are usually in multi locations and thereby

making it environment or climate dependent, especially rainfall. The latter, is the most important since the minimum for non-seasonality based studies robust data would necessitate at least two raining seasons, implying a maximum of two seasons for field evaluations. In the case of countries like Uganda where the author did his field experimentation, it is possible to conduct season-wise replicated experiments in a year. This may not be the case with other ecological zones which have only one rainy season in the year. It is therefore very critical for students and supervisors to take into consideration factors such as geographical setting and/ or nature of the study when selecting research topics whose research is pegged on commodity crops. According to Bentley (2006), before enrolling for a PhD, the prospective student needs to ask him/herself questions such as: why do I want the PhD and can I do a PhD? The latter part of the question is very crucial as it is one thing to have sound reasons to do a PhD, and it is another thing entirely to be able to do one. It is important for the PhD student and the supervisor to understand some things right from the start of the journey, especially, pertaining to the assumptions about the nature of research and knowledge production (Rugg and Petre, 2004; Dimitrov, 2009). Some of these include: what exactly the programme requires or entails and which the institution (University) focuses more, i.e. on course work or research, the work atmosphere in the University, whether the candidate is considered as a student or an employee, is the PhD thesis going to be a book or based on compilation of peer-reviewed and published scholarly articles, among many other conditions (Lantsoght, 2016).

It is essential to note that the PhD candidate does not only need supervision, but also, mentorship. In many instances, the candidate may have the supervision component going well, but lack mentorship (Dietz *et al.*, 2006) which is important and determines to a larger extent what the PhD holder becomes or how he/she performs after earning the PhD and many other expectations from a PhD holder as discussed in the book 'A PhD Is Not Enough! A Guide to Survival in Science' by Feibelman (2011). According to Dietz *et al.* (2006), the problem of poor supervision and lack of mentorship are due to the following: (1) the uncontrolled growth of the number of doctoral students and the corresponding lack of supervision capacity; (2) the quality of PhD supervisors; (3) the quality of doctoral students admitted; (4) the lack of induction experience for new supervisors; (5) the lack of internal evaluation systems for measuring supervision competence; (6) the lack of an enabling departmental or institutional culture to support effective supervision; and many others. Dietz *et al.* (2006) therefore, suggested that, there should be great caution in selecting new doctoral students and choosing new supervisors, designing induction programmes for new supervisors and providing formal training for new and promising supervisors on the technical, ethical, legal, administrative and professional aspects of supervision. The mentoring strategies adopted by supervisors may vary depending on factors such as cultural differences, the need to promote initiative and independence, power and status, bridging power imbalance, and maintaining boundaries between the personal and professional spheres (Dimitrov, 2009). Irrespective of the factors considered and the mentoring approach adopted, the key outcome of mentoring the PhD candidate should be personal development (Chiappetta-Swanson and Watt, 2011).

Lessons and issues for the PhD training at Makerere University

During the PhD training at Makerere University, the author had to deal with a number of issues, some of which are elaborated upon below.

1. Plant breeding, be it the conventional or unconventional approach mostly requires cultivating plants in the field and thus, is dependent on rainfall and other climatic elements. Luckily, there are two major raining seasons in Uganda, making it a total of 6 seasons within the three years of the PhD in Uganda. Therefore, in order to avoid the tendency of going beyond the three years, the author started research (field work) during the first year. This required combining research work with taking taught courses. Though very challenging, through determination, the author was able to finish the research in time without having to sacrifice the course work component. Thus, starting the research work early, was key to the early completion of the PhD study.
2. The biotechnology component of this particular PhD programme made the research very expensive. However, the author did not face the challenge of handling this aspect as he had full doctoral funding from the Carnegie Corporation of New York through RUFORUM. Therefore, he never got stuck at any phase of his doctoral research as every aspect of the budget was covered by the scholarship. But this is often not the case with several students in African Universities, where, funding for PhD studies is scarce.
3. The “PhD journey”, irrespective of the programme or field of study, is said to be a “lonely journey” as there are considerable periods when one works on his/her own thinking and writing. This challenge, is listed as the number one myth/reality by Phillips and Pugh (2005), which they called the ‘ivory tower’. To overcome this, required the need to get used to it during the lonely times, being focused, and, interacting with supervisors, people such as other academics in the department, librarians, colleagues, and others. Postgraduate students should consider the fact that Research and Training for higher degree is an interactive process and requires the development of social and academic skill (Phillips and Pugh, 2005). In my case, I took advantage of the fact that I was in a foreign country and used the opportunity to expand my social academic network. The mentoring approaches used by my supervisors were key to my personal development and not seeing PhD research as an ‘ivory tower’ as others perceive it (Chiappetta-Swanson and Watt, 2011).
4. Most PhD students face a challenge of supervisors not being available or not having the time to read their work and to provide comments to guide or shape the student. However, in this particular case the supervisors were readily available for consultations and they made time to read and critique the reports and draft manuscripts. Therefore, I took advantage of the availability of my supervisors and their willingness to read and made sure that I kept writing while carrying out the research work such that at any point, I had a document with my supervisors for review. Thus, the availability of my supervisors, and their willingness to read, helped in the timely completion of my PhD. The mentoring strategies of my supervisors (Dimitrov, 2009) promoted initiative and independence.

Achievements/Successes/Experiences. By the end of the three years, I had;

1. Completed my research, thesis write-up and submitted the thesis for examination.
2. Published three articles with the fourth one under review and a fifth one yet to be submitted, viz.,
 - a. Afutu, E., Agoyi, E.E., Amayo, R., Biruma, M., Rubaihayo, P.R. 2016. Cowpea scab disease (*Sphaceloma* sp.) in Uganda. *Crop Protection*. <http://dx.doi.org/10.1016/j.cropro.2016.06.024>.
 - b. Afutu, E., Mohammed, K.E., Odong, T.L., Biruma, M. and Rubaihayo, P.R. 2016. Evaluation of Ugandan cowpea germplasm for yield and resistance to scab disease. *American Journal of Experimental Agriculture* 12 (2): 1-18. <http://dx.doi.org/10.9734/AJEA/2016/25138>
 - c. Afutu, E., Agoyi, E.E., Kato, F., Amayo, R., Biruma, M. and Rubaihayo, P.R. 2016. Morphological characterization of Ugandan isolates of *Sphaceloma* sp. causing cowpea scab disease. *Journal of Agricultural Science* 8(9). <http://dx.doi.org/10.5539/jas.v8n9p55>
 - d. Afutu, E., Agoyi, E.E., Odong, T.L., Wasswa, P., Ssekamate, A.M., Biruma, M. and Rubaihayo, P.R. 2016. Molecular characterization of Ugandan isolates of cowpea scab fungus (*Sphaceloma* sp.). *Plant Pathology*. In press.
 - e. Afutu, E., Biruma, M., Rubaihayo, P.R. and Adipala, E. 2016. Cowpea resistance to scab fungus in Uganda: Can resistance be achieved using landraces as source of genes? RUFORUM Working Document Series 14 (1):
 - f. Afutu, E., Agoyi, E.E., Gibson, P., Biruma, M. and Rubaihayo, P.R. 2016. Genetics of resistance to cowpea scab disease and yield components of cowpea. *Field Crops*. (yet to be submitted).

What made these achievements possible?

The availability of my supervisors, timely comments and feedback received from them and the camaraderie that existed between us and mentoring were major contributing factors to attaining these heights. Further, as indicated elsewhere, taking ownership of my research work, planning, managing my time, studying in most cases on my own, developing the skill of writing and bouncing back after setbacks (Lantsoght, 2016) were other key elements that contributed to completing in time. These achievements could not have been possible but for the following: The full doctoral sponsorship from Carnegie Corporation of New York through RUFORUM, covered among others, research funds and stipend, therefore, I was not faced with the temptation of having to take a job and or scavenging for partial sponsorship to survive the period of study. Also, the sponsorship provided for yearly trips back home (for holidays) and made provision for conference attendance which made it possible to connect with scientists and students from different institutions access the globe which helped us to share ideas and critiquing each other's work.

Table 1. Challenges to avoid on the path to timely and successful completion of a PhD

No.	Challenge	Experience
1.	Not wanting the PhD	It is possible that some PhD candidates are not fully in it for the PhD but for other reasons, including waiting for a job and/ or simply remaining a scholar. This is a recipe of failure to complete because when a lucrative job opportunity arises, such candidates abscond. It is important not to see it as just a nice idea to do a PhD, but, to be purpose-driven and be willing to discover what is really required and have the determination to do it. It is essential for the PhD candidate to sit and ask the questions; ‘So do I really want to do a PhD?’ (Rugg and Petre, 2004), or ‘can I do a PhD and what are my interests?’ (Bentley, 2006).
2.	Not understanding the nature of a PhD by overestimating what is required	Dietz <i>et al.</i> (2006) described a PhD as an apprenticeship degree and a scientific project, adding to a body of knowledge. Some PhD students have failed to complete because they have what I refer to as a ‘super fantastic idea’ simply because of this famous question asked to almost all PhD candidates, what is original about your work or what is your contribution to knowledge? Therefore, due to the expectation of originality of the PhD research (Dimitrov, 2009) most PhD candidates get drowned by this euphoria and unable to complete as they tend to get caught in a web of undertaking a research which is not possible to be completed by a single student within even a space of 4 or 5 years.
3.	Not understanding the nature of a PhD by underestimating what is required	It sometimes occurs, that, one stays in the world of work for a long time either with the first degree or better still a Masters, and finally decides to get a PhD when retirement looms, in order to get better post-retirement benefits. In most cases, such students enroll for the PhD not understanding the nature of the PhD by underestimating what is required. There is another group of students, especially in the field of Science, who enroll for a PhD without any clear source of funding for the research to be undertaken, only to wake up to the reality that the nature of

Table 1. Contd.

No.	Challenge	Experience
		PhD research in the sciences is expensive. In situations where such students do not succeed in securing any funding along the PhD journey, they drop out or take longer periods of time to complete, an indication that such students did not understand the nature of a PhD by underestimating what is required.
4.	Having a supervisor who does not know what is required	There are situations where the PhD candidate clearly understands the nature of the PhD but the supervisor does not understand the nature by overestimating what is required. There are instances where some supervisors attend conferences or workshops and having heard or seen others making presentations on some interesting areas of study, they return from such meetings attempting to impose such new methodologies or areas of study on their PhD students without considering factors such as the number of years and most importantly the resources required to do such level of work. The PhD candidate then suffers frustration and delay in completion for the indiscretion on the part of the supervisor. It is therefore important for both the supervisor and PhD candidate to understand both the nature and content of the PhD (Rugg and Petre, 2004).
5.	Losing contact with your supervisor	I have come across many instances of students losing contact with their supervisors and thereby failing to complete their PhD research to graduate in time or entirely fail to graduate. Some of these were as a result of supervisors going on sabbatical to other institutions or the supervisor does not seem to be interested in the direction of the PhD research or the supervisor was assigned even when he had little expertise in the area of study just because of the perception that all academics are qualified to supervise PhD candidates by virtue of having obtained their own PhDs (Dietz <i>et al.</i> , 2006). These create gaps in effective communication between the supervisor and the PhD candidate, resulting in frustration on the part of the student and delay in completion.

Table 1. Contd.

No.	Challenge	Experience
6.	Not having a 'thesis' (as in position or argument) to maintain	I came across one or two students who started the PhD journey at least a year before me and they have not been cleared as having completed because they did not have a 'PhD Thesis'. These students did not have positions or arguments in their research and write-up, and had little information (data) in the write-up. This was an indication that these PhD students underestimated what was required. I have seen many PhD students who purposely set out to do a particular kind of research and were not willing to make any further modification to what they had set out to do simply because they wanted to carry out a research as a follow up to what they did for their MSc. or MPhil. That in itself is not bad, but the question is, would the outcome qualify or give you a PhD thesis? In most cases, such students tend to be rigid and are not opened to any suggestions, be it from supervisors or colleagues. It is essential to know that authoring the PhD thesis is more than just writing (Dunleavy, 2003).
7.	Taking a new job before completing	Many postgraduate students have been lured into taking up new job positions before completing their study, or have taken new jobs to 'survive' because they either did not have enough funds or they wanted more money. Irrespective of what the driving force may be for taking up a job while still enrolled for the PhD, the student may delay unduly or the research suffers, or the student ends up getting what does not qualify for a PhD thesis and may end up quitting.

Source: Phillips and Pugh (2005)

In conclusion, it is important for PhD (research) students to realize that, the 'PhD journey' does not only need brilliance, but more so, determination and application (Phillips and Pugh, 2005), and equally important, for supervisors to see their role as not being a simple one, but as a complex, professional one, which requires more than good will (Chiappetta-Swanson and Watt, 2011). For a successful and timely completion, it is important for one therefore, to avoid the challenges (see Table 1) outlined by Phillips and Pugh (2005).

I would end with these pieces of advice to the doctoral student; do not believe everything you read; keep careful records, and keep the records carefully; look after your finances by making a budget and stick to it; break the work into a series of smaller projects; give credit to others when it is due; listen to your supervisors and, if unhappy, talk to him/her or to someone else; and finally, have in mind that, insomnia happens to everyone, it is just one of many stress related problems that most PhD students experience during the doctorate. When it happens to you, just remember that you are not alone, I suffered from insomnia during my PhD, my colleagues suffered from it, and my supervisors suffered from it during their PhD (Bentley, 2006).

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