AfricaLics

The African Network for Economics of Learning, Innovation, and Competence Building Systems

PhD supervision

A good practice guide for students and supervisors working in innovation and development

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CONTENTS

Introduction

Innovation plays a key role in the economic development and competitiveness of nations. Despite this, there is little formal training curricula for post-graduate studies dedicated to the innovation sciences in many developing countries. The recent Master's training module on 'Innovation and Development' and a pilot PhD visiting fellowship scheme by the AfricaLics research capacity building project (funded by the Swedish Agency for International Development) is part of an effort to encourage the development and introduction of appropriate training programmes on innovation and development in African Universities.

These post graduate training programmes will enhance the number of dynamic young researchers who will be able to go on to teach in universities, conduct high quality research on innovation and development and provide sound policy advice to, or from within, governments.

For those studying at postgraduate level, the degree of success that they will have in ultilising their knowledge is, in part, bounded by the quality of the teaching they receive during their PhD studies. It is now accepted that successful Master's and PhD programs require effective supervision (see e.g. Grant, 2003 and Lovitts, 2005).

Although the nature and type of supervision that would be effective is likely to be different across research fields and contexts, there are some generic guidelines that are promoted to ensure a facilitatory study environment in any post graduate research area. Various books provide details that outline such guidelines – from the perspective of the student and the supervisor. One of the most well recognised of these is:

> Phillips, E.M and Pugh, D.S. (2010) How to get a PhD: a handbook for students and their supervisors, 5th ed., Maidenhead: Open University Press

The purpose of this brief manual is to set out the 'barebones' of supervision good practice within a PhD program in the subject of 'innovation and development' as opposed to any other subject area. It will indicate areas of good practice and provide supervisors with details of existing open source materials for further readings.

A PhD in 'innovation and development'

A doctor of philosophy (PhD) is the highest level of academic degree that is awarded by universities to an individual who has successfully conducted original research. PhD research should contribute new knowledge to a particular field. It should also prepare the candidate to be an independent researcher. It entails conducting extensive research and writing in one's chosen field of study in order to provide a unique contribution to that field of study in which the PhD is being pursued.

A PhD in 'innovation and development' is a social science focused postgraduate degree although it can be offered in a faculty or school outside of the social sciences i.e. a school or faculty of Engineering or Biological Sciences. It involves similar steps (literature review, independent original research and subsequent write up of results) to a PhD in any other area of the social sciences.

What defines a PhD in 'innovation and development' from a PhD in development studies or a PhD in economics or sociology is its multidisciplinary focus. It draws on elements of all of these disciplinary areas crosscutting the economic and development sciences, innovation studies or science and technology studies. It can also incorporate elements of engineering, biology, chemistry, physics etc. – the so-called 'hard sciences' as required. It combines these to investigate an element of innovation and how it can or cannot assist the transformation of developing economies.

Innovation in this context is not just that which is 'new to the world' i.e. new inventions or products. It includes things that are 'new to the context'. And specifically, this area of research is focused on innovation that impacts economic or social development of individuals, households, communities, nations or continents. Such research recognises that often innovation takes place incrementally in firms and the informal sector – it isn't about the sudden discovery of a new way of doing things, a new material or creation of a new technology. Innovation takes time and is over the result of small changes in product design, the process of product innovation and the way businesses function. Research in this area asks how such innovations impact – positively or negatively – on economic and social development. So, some of the overarching questions addressed by this field of study are:

1. There is growing evidence that innovative activity impacts economic growth but what type of innovative activity is most appropriate to ensure individuals, households and communities benefit? Is there some innovation that should be promoted in certain areas of the economy or society in order to enhance economic and social development?
2. How does innovation take place in countries that are resource poor as opposed to those that are resource rich?
3. Is there a difference between what innovation looks like in the formal and informal sectors and what are the impacts of different types of innovation in these sectors?
4. Who does innovation in different environments? How can marginalized groups be included in innovation processes?
5. Are there particular combinations of actors that are more likely to produce innovation that is beneficial to economic and social development?

6. What other enabling environment factors are important? Is the idea of having a form of enabling system – an innovation system – useful?

This guide gives generic advice on good PhD supervision practice from the viewpoint of students and supervisors. It also aims to provide specific advice on elements of supervision that are specifically relevant to a PhD in innovation and development covering these types of questions. We would argue that there are elements of study that a student should cover which – in combination - make studying a PhD in this area conceptually different from a PhD in economics or sociology or engineering. Perhaps the closest 'cousin' conceptually is that of a PhD in development studies. However, a PhD in innovation and development focuses on one specific element of development studies and expands upon it in greater depth. Therefore, this guide will outline what could be argued are the 'core courses' or material every student of innovation and development should have covered in their first year of PhD study in order to ensure they come out a 'rounded' researcher and not just a specialist in their particular focus area.

Challenges and opportunities of studying a PhD on innovation and development in Africa

It is possible to classify the challenges and opportunities of studying a PhD on innovation and development in Africa into four broad categories relating to the context of the environment; specific issues for students and facing supervisors together with issues specific to studying innovation and development. The elements of these categories are explored below.

The context of the study environment

There are two elements of the context which need to be mentioned here:

1. The situation of many African universities
   African universities are in a period of transition. There are not only increasing numbers of them but they are increasingly high quality, research driven universities providing education and employment opportunities as good as, if not better, than universities in other parts of the world. That said, there are still universities where resources are lacking, the morale of teaching staff is low and a desire to gain as much revenue as possible means high student numbers, crowded facilities and little value for money. As such, two students attending different universities could have markedly different experiences.

2. The situation of African nations' economic growth and social cohesion
   Africa is seen increasingly as the continent to watch in the coming years. Several African countries regularly feature in investment opportunity indexes (Nigeria, Kenya and Ghana especially) as global corporations start setting up shop in Africa. In addition, many countries in Africa benefit from a variety of natural resource endowments that have made them attractive to investments while others are making a mark in the manufacturing sector. With this comes increasing economic growth; many African countries have growth forecasts that are well above some Northern developed economies. Yet, despite this economic inequality remains and is often increasing; youth unemployment in many countries is high; and significant social problems (health, environment and security) remain. This dichotomy between the potential and the reality on the ground for the majority of the population provides a strong rationale for why high quality research by well trained researchers is so important for the future of African nations, particularly in the area of innovation and development.

Student perspective

Studying a PhD can be a very lonely and frustrating process. Students often suffer from anxiety about their ability to understand the material that they are researching or the quantity of data they collect and then have to sift through. Some students struggle with referencing, others with writing or data analysis. Many PhD students, especially in Africa,

have to also juggle study with work or home lives; making it difficult for them to find dedicated time to work on their studies. Many struggle with the cost of doing a PhD when there are few bursaries or study grants available on the continent. Finally, PhD students in African universities can face poor computer access, internet connections, old and irrelevant library resources and the other issues raised above with regards the situation facing some African universities. Finally, especially, but not limited to, PhD students who have work experience, often in their topic area, it can be a challenge to be open to new ideas and new ways of thinking.

Supervisor perspective

PhD supervisors are often required to supervisor PhD students in addition to their teaching loads which, combined with a rising number of students in universities, often mean less time to spend with each student. Many supervisors juggle multiple roles both within and outside the university further impinging on their time available to provide adequate supervision. Supervisors also differ in their perspectives in how to treat PhD students. There is often a tradition of supervisors being held in high esteem by students and being expected to become unofficial support staff for their supervisors. This affects the dynamic of supervision. Finally, supervisors – just as much as students -can suffer from a lack of access to materials – mostly as a result of poor infrastructure.

Issues specific to studying 'innovation and development'

The issues of time and resources for PhD supervisors is particularly hindering when many supervisors come from traditional disciplinary backgrounds and need time and resources to become acquainted with the burgeoning innovation and development literature as well as multidisciplinary approaches to research. The AfricaLics community is made up of PhD students and supervisors who come predominately from within schools or faculties set up across traditional discipline boundaries of economics, sociology, business, engineering, natural sciences, agriculture etc. Many have never come into contact with literature on innovation systems thinking, science and technology studies perspectives or development economics literature. All of these are core underpinning approaches to the research field of innovation and development.

In view of these challenges and opportunities, this manual will start by introducing these more generic elements and pointing supervisors to material that already existing on where to get more information to assist in ensuring best practice is achieved in both the process of a PhD and its supervision. It will then go on to provide a suggested set of core materials and study areas that provide the basis for the rounded researcher in the field of 'innovation and development'.

General recommendations relating to the PhD process and supervision

As noted in the introduction there are elements of a PhD process that are generic across the board. These relate to the way the PhD is planned and the type and frequency of PhD supervisor-student interaction. There is also some generic research training which students are interestingly being given regardless of their PhD subject matter in order that they become well rounded and thoroughly trained researchers of the social sciences.

The PhD process and PhD supervision

Most PhD formats involve a three year time period whereby the first year is an investigative and planning year (sometimes supplemented with taught courses), the second involves data collection and analysis while the third is write up and thesis presentation.

The recommended milestones and supervision schedules are outlined in Annex 1.

During the first year that a student studies for a PhD, there is increasing recognition that there is a need to provide students with initial training in key skills to become employable researchers on completion of their PhDs. For example, the UK's Research Councils developed a joint statement on skills training that harmonised the expectations of different actors in skills training available here.[1]

During this time the role of a supervisor is critical to guide the candidate in the right direction and ensure successful completion. The first part of this is ensuring the right supervision team.

After the topic is chosen: finding a supervisor

When a student looks for their principal supervisor, it is important that they find someone who they can get on with but also someone who has sufficient knowledge in the area of that particular PhD project. The principal supervisor might not have all the knowledge of the complete area. As a result, many universities recommend team supervision whereby a student is able to call on the expertise of between 2-3 advisors who can provide assistance throughout the PhD.

The role of the supervisor is to provide support, guidance and timely feedback to facilitate successful completion. In addition, it is the supervisor's role to ensure that the student adheres to the requisite ethics and rules of conducting research.

Supervision is only effective if there is a good rapport and respect between the supervisor(s) and the student. Therefore, while the PhD supervisor has specific roles to play so too does the student. These responsibilities of each party are outlined in Box 1.

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[1] http://www.rcuk.ac.uk/RCUK-prod/assets/documents/skills/statementofexpectation.pdf

Box 1: The responsibilities of the PhD student and supervisor(s)

Responsibilities of a PhD supervisor	Responsibilities of a PhD student
Facilitating students to undergo relevant training and participate in workshops and conferences	Abiding by the rules and regulations of the academic institution they are affiliated
Providing timely sufficient advices to students to write scientific texts and offer constructive criticism of their manuscript up on review	Discussing and setting mutual and convenient mechanisms to maintain contacts with supervisor/s
Supporting students to integrate into the broader research environment (e.g. faculty and department members)	Taking and appreciating suggestions, comments and critical reviews concerning their PhD project
Advising and encouraging students to produce academic deliverables, such as journal publications, that ensure dissemination of research outputs and an easy viva	Meeting deadlines and Planned milestones as agreed with the supervisor
	Fulfilling all the requirements at all stages of the PhD programme
Encourage students to present their work to other faculty/department members and gain feedback	
Prepare students for the ultimate PhD defence examination	
Encourage students to think about their future career Path	

(Taken directly from: University of Reading Graduate School (2013), accessed 21/01/15. Available here)[2]

Further information on outlining the roles, responsibilities and traits of 'effective' supervisors and students have been written by Due and Kobayashi (2010) available here. To lead the way: inspiration to PhD students and their supervisors. Available here.[3]

Choosing a supervision team

Different universities have different rules on the number of assigned PhD supervisors. But, it has become increasingly common to assign a student with two supervisors. One should be a professor with a track record of successfully supervising PhD students and should take the leadership in advising the student on academic issues. The second may be an assistant or associate professor. The second supervisor is provides the opportunity to ensure students have a second set of expertise to draw on but is often, because they are junior staff, allocated to handle day-to-day financial and logistic matters. The second supervisor is often – but not always – 'learning on the job' i.e. seeing their first student to successful completion in order to then be able to become eligible to become a first supervisor.

Some universities also encourage team supervision arrangements whereby students receive support and mentorship from more than two supervisors. In such situations, it is

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[2] http://www.reading.ac.uk/web/FILES/graduateschool/pgrsupervisiongoodpracticeguide.pdf
[3] http://www.ind.ku.dk/udvikling/projekter/phdvejledning/Final_KU_god_vejledning_UK_web.pdf

important for there to be clear lines of responsibility and communication between supervisors and between the student and the supervisors.

The relationship between a student and a supervisor

A good PhD experience is often determined by establishing and maintaining a good working relationship between a student and a supervisor. Although these relationships remain personal and unique, there should be an atmosphere of appreciation and respect between the supervisor and the student. This is particularly important when the supervisor and the supervisee do not share similar cultural backgrounds.

Furthermore, as already stated, for many PhD candidates studying for a PhD may sometimes be difficult, characterized by loneliness and frustrations. These feelings may be worsened by miss-behaving data, decreasing self-confidence and poor supervision. Negative experiences may be emotionally and psychologically draining to students and may lead to delayed completion or even failure to finish.

It is in such difficult times that the role of the supervisor becomes more critical. The supervisor needs to guide his/her candidates in the right direction. Lovittis (2005:48) has stated that:

> "[…] integration with one's adviser and fellow graduate students is very important for providing students with the support and information they need to work through the frustrations".

For a successful PhD study journey positive supervisor-supervisee interaction is key. There could be many forms of supervision interactions. For example, Dietz et al. (2006) identifies six types of supervision styles of PhD mentors. These include: 'delegater', 'expert guide', 'quality controller', 'coach', 'friend' and 'co-writer'. These styles of supervisions involve different types of behavioral interactions and task orientations between the supervisor and the student while steering and conducting the PhD research. For example in the case of 'expert guide' supervision, "…supervisors keep a distance towards their candidates as far as personal elements are involved. Some do not know, or do not want to know, about the family/household background of their candidates, and never visit them at home. They see their role mainly as stimulating a process of work improvement, and help their candidates to 'grow' as a scientist" (Dietz et al., 2006: 72).

Despite the differences in supervision approaches among different supervisors, which may also change from one style to the other at different stages of the PhD milestone, it is generally recommended that a supervisor is patient and understanding of his/her PhD student. A positive and supportive attitude is key to guide the student in the right direction. This helps the candidate to easily come out of the hurdles that he/she faces at different stages of the PhD study. This is because positive attitude allows the student to be open to the supervisor in communicating challenges. Besides, the supervisor should show commitment to the project since mentoring PhD students requires substantial time investment. The supervisor has to closely asses the progress of the student and stay committed up to successful graduation.

For their part, the PhD candidate should also be motivated and committed towards his PhD study. The student must realize that the PhD research is his/her major responsibility, and as such should be prepared to proactively fulfill expectations. The candidate should form a productive professional relationship with the supervisor. He has to set reasonable expectations and limits of the supervision process.

Increasingly many universities are making it mandatory for students and supervisors to sign informal contracts with each other to ensure that they are aware of what each of their responsibilities are.

See Annex 2 for an example student-supervisor contract.

Supervisory communications

To build a good relationship, it is key to maintain robust communication from the onset. The scale, means and frequency of communication may depend on the nature and progress of the PhD research, and may also be individual. In general it is recommended that in the early years close and frequent interpersonal communication is needed.

This involves face-to face communication at least once per month for the first year and regular correspondence through digital communication tools, such as email.

The communication should establish reasonable expectations in terms of deliverables, roles and responsibilities of both the student and the supervisor to be ultimately successful in the 'go no go' decision at the end of the first year.

The University of Reading Graduate School (2013) provides the following suggestions to conduct initial supervisory meetings:

- Discuss and agree with expectations from both sides (expected guidance, feedback, deliverables, milestones, and so on)
- Agree on frequency and length of meeting
- Explain that your role is steering the student to conduct his/her research that will lead to a PhD conferral
- Ensure that the student appreciates 'constructive criticism'.
- Explain to the student that you will help review his research work, and reviews and feedback are key components of scientific tradition which are aimed at ensuring research quality and the student develop his research skills.
- Discus on how to conduct meetings, prepare agendas and record and share minutes
- The intensity of communication or frequency of meeting times may be decreased after the first year to allow the student to work more independently

The limits of supervision

The major role of supervision is to guide PhD researchers to acquire the skills and capabilities to become independent researchers. While supervision is critical for the successful completion of a PhD, it is important not to consider or treat students as secretaries or data entry assistants. On the other hand, while a certain level of independence needs to be assured, a 'sink or swim' approach to supervision is not appropriate. It is therefore vital to strike a balance between a heavy hands-on and complete hands-off approach.

Third party monitoring and mentoring systems

One mechanism that can be used to support students are mentoring systems whereby PhD students who are further through their studies become 'buddies' to newly registered students. In other institutions, a third person (or 'party') is assigned to them and asked to meet with the student on a regular basis to 'check-in on them' and make sure the student is coping and provide advice as needed. Both of these mechanisms are ways in which students have another avenue to gain support through the often lonely process of conducting a PhD and a means to voice any concerns they may have about their supervision with someone who isn't their supervisor. These mechanisms are useful ways

of enabling the student to give feedback on their supervisors; to air frustrations about the PhD process that they would feel uncomfortable doing in front of/ to their supervisor(s) or for more pastoral support when a student has problems with finances, housing etc.

While some universities prescribe these mentoring and monitoring systems, often students set up their own mentoring and support networks themselves. Students should actively be encouraged to do so. Face to face regular meetings between PhD students in the same faculty or department over a coffee or after a class provide a tried and tested means of supporting each other. With more and more digital communication applications available, students are increasingly using these mechanisms to provide support to each other. In the AfricaLics community, various groups of students have set up Whatsapp, facebook and Linkedin groups to provide support to each other, often across country divides.

Specific areas of support needed for students studying PhDs in innovation and development in Africa

A PhD in innovation and development as outlined in the introduction section is a specific field of study that overlaps across disciplines and subject areas. It most closely aligns with development studies but also specific PhD topics might be more aligned to other disciplinary areas from economics, to politics, to gender studies to engineering or biology.

As such, trying to develop a core set of subject areas that would provide the basis for a well-rounded 'innovation and development' researcher is a challenge. The AfricaLics Secretariat has been working on just this through the development of a model PhD programme in 'innovation and development. The model will include details of the core topics a student should study together with recommended core texts for each topic both from a theoretical and methodology perspective. This will be available on the AfricaLics website from late 2016.

For now we outline in brief what these core topic areas are and provide links to existing material on these topics that is available in the public domain.

For these materials to be useful – because many of them will not be areas that students or supervisors have nevessary engaged with before – there is a need for both students and supervisors to be open minded to multidisiplinarity and to a range of different theories and approaches from within the social sciences.

The links to existing material are provided in order that – when students or supervisors – are unfamiliar of the topic areas, it is possible to provide suggestions on where they can go to find literature and the research methods training they need.

In fact one could argue that there is in fact a minimum standard for both the supervisor and student in terms of types and forms of knowledge that are required to successfully supervise and undertake a PhD in innovation and development.

Study topic	Material to cover	Links to open source learning material
Innovation studies	What is innovation, why it is important for economic and social development – what is the relationship between them?	http://www.africalics.org/resources/knowledge-bank www.innoresource.org
Science and technology studies	How do people interact with science, technology and innovation?	http://www.stswiki.org/index.php?title=Main_Page http://easst.net/resources/
Development	What explains	http://www.theguardian.com/global-

studies	uneven economic and social development across and within countries? What factors influence this development?	development/2011/sep/21/first-year-development-student-books www.eldis.org
Econometrics	How can we test hypotheses about the interaction between innovation and development using maths and statistics?	http://www.globelics.org/publications/Econometrics http://www.oswego.edu/~kane/econometrics/ https://sites.google.com/site/econometricsacademy/home
Mixed methods	How can a mix of quantitative and qualitative research methods provide a means to study innovation and development?	https://mmira.wildapricot.org/mm-resources

There are also two further areas that are both generic and specific in their focus:

Journal paper writing skills

This is a skill increasingly necessary for every PhD student to acquire before they have completed regardless of their subject area. However, it is important that supervisors are able to provide clear advice on the types of journals that are available in the innovation and development field and advise students on their submissions accordingly.

A list of journals specific to innovation and development are available here:

http://www.globelics.org/publications/globelics-journal-network/

Communicating research findings to academics

All students need to engage with their wider academic and stakeholder community as much as possible throughout their studies. It is important that they have the chance to engage with relevant stakeholders and academics in their area of study and potential impact. Conferences, PhD student conferences and workshops. A few of the major ones are:

AfricaLics, Globelics and other regional LICs events – see www.globelics.org and www.africalics.org

Schumpeter conference (for those doing economics PhDs) – see http://www.iss-evec.de/information.htm

EASST and 4S - see http://easst.net/conferences/ and http://www.4sonline.org/meeting

The Atlanta Science and Technology Policy conference – see http://www.atlantaconference.org/

Communicating research findings to others

Students should be encouraged to present their results to relevant stakeholders – at the heart of innovation and development is the need to ensure research and innovation has a positive impact on social and economic development. Often this is encouraged through the writing of policy briefs. Writing a good policy brief requires skills that are different from those required to writing a PhD. Skills advice for writing policy briefs is available here:

http://www.idrc.ca/EN/Resources/Tools_and_Training/Documents/how-to-write-a-policy-brief.pdf

http://www.publicengagement.ac.uk/plan-it/who-engage-with/policymakers

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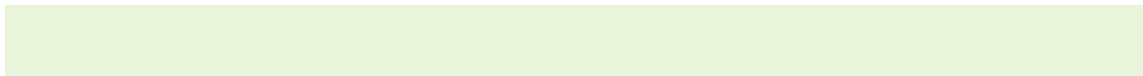
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Annex 1: Milestones and recommended supervision timetables

	First year	Second year	Third year
The student	• Review literature and develop the research proposal and PhD plan • There might be a requirement to take some taught courses • The minimum deliverable at this stage is a solid proposal with a clear list of to-dos within the PhD plan • At the end of the first year, there will be a mini viva/ probation exercise where a go-no-go decision will be made on being able to proceed with their PhD • Students are encouraged to take the lead in organising supervision meetings, keeping records of meetings etc. – Students must own their PhD. A supervision meeting once a month is the recommended minimum although sometimes more regular (every two weeks) meetings are	• Must to carry out fieldwork and collect data for their thesis as per their thesis proposal • The minimum deliverable at the end of the second year is complete data for the doctoral thesis • Again, students must own their PhD while also maintaining contact and taking advice from their supervisors. A supervision meeting once a month is the recommended minimum, although during fieldwork less frequent supervision meetings are possible.	• Must write and finalize the PhD thesis • The minimum deliverable at the end of this year is completing and submitting a PhD thesis • Again, students must own their PhD while also maintaining contact and taking advice from their supervisors. A supervision meeting once a month is the recommended minimum but as students progress in their writing they my desire more regular meetings (every two weeks) • Must defend the thesis at oral presentation/defense if this is a requirement at the university where the PhD is submitted. • Meet the deadline of publishing at least two

The supervisor	• Will monitor the progress made by the student and offer critical feedback • It is useful to maintain close supervision and offer timely feedback to enable the student to find a research niche • Encourage the student to produce text from the onset, including critical reviews of existing scientific literature • The supervisor should assist the student to integrate with other existing researchers in the faculty. • Encourage the student to make formal and informal interactions with other scholars who can potentially guide them to develop concept notes for their research (i.e. networking with other	• Continue to monitor progress and offer critical feedback • Encourage the candidate to present at conferences and draft and submit manuscripts to journals • Encourage students to handle journal submissions, address reviewer comments, including handling of manuscript rejections and learning from such experiences	• Continue to monitor progress and offer critical feedback with increasing intensity as the student gets closer to submission • Encourage the candidate to present at conferences and draft and submit manuscripts to journals • Encourage the student to handle journal submissions, address reviewer comments, including handling of manuscript rejections and learning from such experiences • Encourage students to draft text for thesis and facilitate timely submission of thesis and completion of the PhD

Annex 2: Examples of a student-supervisor contract

There are a range of examples student-supervisor contracts available on the web. Some are formal agreements, others a set of guideline principles to which each person must adhere to.

Here are a few examples of what can be found on the web:

https://www.grad.ubc.ca/forms/student-supervisor-agreements

http://www.phd.teknat.aau.dk/digitalAssets/80/80753_suggested-areas-for-agreement-between-student-and-supervisor.pdf

http://www.ncl.ac.uk/students/progress/assets/documents/LearningAgreement.pdf

http://w2w.meteo.physik.uni-muenchen.de/early-career/contract_eng.pdf

http://www.unisa.ac.za/contents/colleges/col_grad_studies/docs/Supervision_agreement_graduate_student_supervisor.doc

An additional useful source of information on PhD research and supervision in the African context is available here: http://www.idea-phd.net/developing-managing/supervision