SMARTER STUDY SKILLS

HOW TO RESEARCH & WRITE A SUCCESSFUL PhD

KATHLEEN McMILLAN & JONATHAN WEYERS

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HOW TO
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KATHLEEN McMILLAN &
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CONTENTS

RESEARCH METHODS

WRITING UP YOUR RESEARCH

ABOUT THE AUTHORS

Dr Kathleen McMillan was formerly Academic Skills Advisor and Senior Lecturer, University of Dundee.

Dr Jonathan Weyers was formerly Director of Quality Assurance, University of Dundee.

Both are now freelance authors specialising in books on skills development in Higher Education.

This book represents a synthesis based on over 60 years of combined administrative, teaching and advisory experience, much of it devoted to postgraduate level. We have supervised and supported numerous PhD students, conducted postgraduate induction events and led skills workshops covering such diverse topics as thesis writing and personal development planning. Our backgrounds in the Arts and Humanities and Life Sciences respectively mean that our support has covered a wide range of subjects – from biology to orthopaedic surgery; information and communication technology to law, as well as English as a foreign language.

Above all, we have spoken to countless students, both individually and in focus groups, and have consulted with fellow academics about research skills that underpin a wide range of disciplines. As well as gaining PhD qualifications ourselves, we have also observed at close quarters our own children taking on postgraduate study and training.

Our former responsibilities involved drawing up regulations for PhD study, responding to research student feedback and a range of postgraduate committee work. We have carried out a number of relevant projects, most notably the writing and editing of an extensive Website providing guidance for postgraduates studying at the University of Dundee. Our collaborative writing has produced eight books on diverse aspects of learning and writing at university level. Most of these have appeared in several editions and they have been translated into a total of seven other languages.

In short, we have read widely, thought deeply about relevant issues and tested many ideas related to the postgraduate research experience. This book is a distillation of all the best tips and techniques we've come across or have developed ourselves.

PREFACE

We're delighted that you've chosen *How to Research and Write a Successful PhD* and we'd like to think it's because this book promises insight into the postgraduate experience and gives you plenty of useful tips to help you take on the challenge of a research degree.

We recognise that adjusting to this level of study is not always easy. There are challenges related to the necessary depth and originality of research work, but also to organising one's activities over three or more years to culminate in what is possibly the longest and most complex piece of writing you will ever produce – the PhD thesis.

Of course, you will already have developed some essential skills from undergraduate days, especially if this involved an honours year in which a dissertation or research project was an important outcome. Nevertheless, there is a step change in the quality of work required for postgraduate research, which effectively must meet the full publication criteria of the academic world.

We start the book, therefore, with chapters that identify and discuss the essence of postgraduate work. We then move on to the identification of a topic for your research and how this can be framed as a formal research proposal. The next section deals with the essential skills of a postgraduate, especially those related to information literacy. The focus here is on taking responsibility for your own skills development as a trainee 'professional researcher'. Following this, we move on to discuss the interactions you will have with others during your PhD research and how to make the most of these relationships, whether they be discussions with your supervisor(s) or progress committee, working within a research team or with the audience when presenting a seminar or poster.

Research methods are, of course, an essential component of postgraduate work. Whilst we cannot give specific advice here, we are able to focus on some essential generic skills, including those related to critical thinking, ethical research, citation, referencing, data acquisition and data analysis. The thesis write-up is the most difficult stage for many students, and here our emphasis is on generic

guidance for becoming an autonomous writer. Along the way, we discuss how good writing is planned and constructed and how to structure and present your thesis. Finally, we deal with the PhD *viva* and the follow-up in terms of publishing your research and moving on to the next stage of your career.

We've tried to remain faithful to the idea that this book is one that you can dip into when you feel you need friendly advice and assistance. We had many types of students in mind when we decided to write this text and we hope that it will meet your own specific needs. Of course, research approaches vary across the wide spectrum of subjects studied at universities. These diverse discipline contexts have been accommodated by focusing on generic guidance but differentiating advice where appropriate, and particularly where research practice differs across the science and non-science divide.

We hope you will enjoy your years as a postgraduate researcher – certainly, you will find it a time of significant personal development, and eventually, with your contribution to knowledge and understanding placed in the public domain via your thesis and other publications, highly satisfying. We'd be pleased to hear your opinion of the book, any suggestions you have for additions and improvements, and especially if you feel that it has made a positive difference to the way you study and approach postgraduate research.

Kathleen McMillan and Jonathan Weyers

ACKNOWLEDGEMENTS

As PhD students ourselves as well as supervisors, trainers and examiners of PhD students, we have gained much from interactions with colleagues and students. Much of our accumulated wisdom from these exchanges is expressed in this book. Some of this material was developed during the construction of the postgraduate section of the website Advance@Dundee (internal to the University of Dundee). We thank all of our colleagues and friends who helped us with that project, especially Margaret Adamson. We have also contributed to the training of PhD students, especially in the area of writing up, and we thank colleagues for the opportunity to develop our ideas and contribute in that area.

Many others have influenced us and contributed in one way or another to the production of this book, including: Rami Abboud, Richard A'Brook, Michael Allardice, John Berridge, Richard Campbell, Cathy Caudwell, Louisa Cross, Stuart Cross, Margaret Forrest, Martin Glover, John Hillman, Andy Jackson, Allan Jones, Rod Jones, Peter McEleavy, Janet McLean, Christine Milburn, Kirsty Millar, Dave Murie, Fiona O'Donnell, Richard Parsons, Neil Paterson, Jane Prior, Colin Reid, Mhairi Robb, Dorothy Smith, Eric Smith, Gordon Spark, David Walker, Lorraine Walsh and David Wishart. We are indebted to the support and interest of the Royal Literary Fund and particularly the RLF Writing Fellows in our university, distinguished authors in their own right, who have given wise words of counsel: Bill Kirton, Brian Callison, Jonathan Falla and Gordon Meade. Also, we acknowledge those at other universities who have helped frame our thoughts, especially our good friends Rob Reed, Nicki Hedge and Esther Daborn, as well as the membership of the Scottish Effective Learning Advisors who work so energetically to help students to develop many of the key skills that are addressed in this book.

We owe a special debt to the senior colleagues who encouraged various projects that contributed to this book, and who allowed us the freedom to pursue various avenues of related scholarship, especially Robin Adamson, James Calderhead, Chris Carter, Alan Davidson, Ian Francis, Rod Herbert, Eric Monaghan, Graham Nicholson and David Swinfen.

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The sections 'Designing experiments' and 'Sampling' in Chapter 24 are partly derived from material in Jones, Reed and Weyers (2012), with permission. Table 2.1 is reproduced courtesy of the SCQF Partnership. Table 20.1 is reproduced courtesy of Dr Eugene Garfield.

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HOW TO USE THIS BOOK

Each chapter in *How to Research & Write a Successful PhD* has been organised and designed to be as clear and simple as possible. The chapters are self-contained and deal with particular aspects of the subject matter so that you can read the book through from beginning to end, or in sections, or dip into specific chapters as you need them.

At the start of each chapter you'll find a brief paragraph and a **Key topics** list that let you know what is included. There is also a list of **Key terms** at this point that highlights words that may be new to you or may be used in a particular way in the chapter. Should you be uncertain about the meaning of these words, you will find definitions in the **Glossary** at the end of the book.

Within each chapter, the text is laid out to help you absorb the key concepts easily, using headings and bulleted lists to enable you to find what you need. Relevant examples are contained in figures, tables and boxes which complement the text. The inset boxes are of three types:

Smart tip boxes emphasise key advice that we think will be particularly useful to you.

Information boxes provide additional information that will broaden your understanding by giving examples and definitions.

Query boxes raise questions for you to consider about your personal approach to the topic.

Finally, the **Action Points** section provides three suggestions for possible follow-up action as you consider ideas further.

INTRODUCTION

1 TAKING ON POSTGRADUATE STUDIES

Preliminary considerations

Studying for a PhD will involve the exploration of uncharted territory not only in your research project, but also in your personal development. Making the right choices for project, supervisor and department are important. This chapter introduces the issues to be considered when applying for a studentship and outlines the milestones of a typical PhD.

KEY TOPICS

- → Being realistic about postgraduate research
- → Deciding what to study, where to study and with whom
- → The application process
- → Approaching postgraduate study in the right frame of mind

This book starts from the assumption that you have already made the fundamental decision to carry out postgraduate research. There are many potential reasons why you might wish to take this direction, including:

- a desire to contribute to the sum of human knowledge and understanding;
- the wish to stretch your intellect to its limits;
- a deep interest in a particular subject area or topic;
- the chance to learn alongside an acknowledged expert;
- the hope of making a difference to the world and its people;
- the need to gain a qualification that will prepare you for a desired career path;
- an attempt to delay the time when you must leave the university environment.

Whatever your motive(s), you will have a significant personal stake in this project – your time, money, family and future career may all be affected by your decision. It makes sense to approach this undertaking with a clear view of what you need to do to accomplish the goal of gaining a doctoral degree.

BEING REALISTIC ABOUT POSTGRADUATE RESEARCH

Many of the initial feelings of becoming a postgraduate research student will mirror those you may have felt as a new undergraduate student. You will possibly move to another location, adopt different patterns of working, form relationships with new people and have to come to terms with a higher level of study. Yet, in other ways, becoming a new postgraduate will be very different from that undergraduate experience because:

- there is no 'road map' in terms of a syllabus and course/module structure;
- there will be far fewer students studying for the same degree and, in all probability, no one carrying out exactly the same research;
- to a far greater extent, you will be expected to direct your own activities and create your own goals.

Understandably, this might cause some apprehension. However, you should take confidence from the fact that that you have demonstrated the ability to cope through your earlier experiences and qualification(s). Dealing with the challenges of postgraduate research will, nevertheless, require a proactive approach. To channel your effort effectively, it is vital that you comprehend the nature and requirements of work at this new level.

One key way in which a postgraduate's life differs from that of an undergraduate is in work-rate. Usually, PhD students are expected to work a normal 9–5 day, just as if you were in regular employment. Some types of study are particularly demanding, requiring lengthy sequences of reading or inconveniently timed procedures. Supervisors often lead by example, putting in long shifts from very early starts to their days, and may expect you to do the same. Bear in mind too that you will not have normal student holidays. Your leave entitlement will be determined by your studentship. Most state a 6–8 weeks' allowance per year, and you should expect to plan ahead and inform your supervisor when you would like to take leave.

What will postgraduate study be like?

Here are some questions to ponder before you start:

- **Will it be easy?** No, because that's not really the point. The aim is to stretch your knowledge and understanding to its limits. That's a tough experience.
- **Will it be enjoyable?** Not always – you can expect up and downs. Sometimes, you may experience extreme elation, for example, when you make a research breakthrough. At other times, it may seem like a slow grind.
- **Will I be able to cope?** Very probably. Your undergraduate honours degree classification (almost certainly an upper second or first) demonstrates that you have the ability to adapt to this more independent, self-directed style of learning.
- **Will it expand my mind?** Almost certainly, yes. It has the potential to take you to intellectual places you cannot imagine when you start.
- **Will it develop my skills?** Definitely. As well as project-specific skills, you can expect to develop many generic skills and especially those relating to expressing yourself in writing.
- **Will it be rewarding?** Not necessarily in monetary terms (at least, not in the short term). Rather, you can legitimately expect fulfilment at a deeper personal level.
- **Will it help me to get a job?** Don't bank on it. A postgraduate research qualification can act like a double-edged sword. It might allow a brilliant fit with a job specification; on the other hand, you may end up seeming to be over-qualified.
- **Will it be worth the effort?** Absolutely. The points above represent a reality check – because life often isn't as straightforward and smooth as we'd like. By the time you finish your PhD and are walking across that graduation platform you will be a very different person: enriched, fulfilled and on top of your world.

Most PhD research projects are allocated three years of funding and are expected to be completed within this time, although some stretch beyond this. The UK research councils (Ch 5) monitor completion rates and penalise universities whose students tend not to submit on time, so expect keen interest in your progress as a result. Universities are also required to meet certain quality standards in relation to the

postgraduate research experience, and may be reviewed periodically by external bodies. The relevant codes of practice, which apply throughout the UK, set standards for such matters as admission, supervision, ethics and treatment of appeals and complaints.

Influences on your PhD performance

Examples of stimuli from different sources:

- **Yourself** – you set your own agenda and work-rate; provide project ideas; establish the standard and efficiency of your work; and supply the impetus to complete on time.
- **Supervisor** – imposes standards and work ethic; provides project ideas and working environment; and gives feedback.
- **Department and University** – provide a regulatory framework for supervision and facilities; an agenda for monitoring progress; administer progress monitoring schemes; set up examinations; and award your qualification.
- **External agencies, such as the Quality Assurance Agency and the Higher Education Academy** – create benchmarks for University regulation; publish codes of practice; audit how these are implemented; and monitor student satisfaction.

Table 1.1 provides a sequence of the key events and milestones for a typical research project, together with an indication of standard work activities and how these will be associated with different thought processes and writing skills. Looking at relevant sections of this table from time to time should assist you to gauge your progress and assess your training requirements. You may find that progress monitoring meetings will prompt such evaluation, but should understand that, at this level, the onus is on you to set a personal agenda.

You will find that you will be more productive in your research if you set aside time to socialise, relax and pursue your hobbies and interests. Research students in certain subjects may find research in libraries and archives somewhat lonely. Meeting other postgraduates socially can make all the difference. Sharing accommodation could be one way. Also, postgraduates can join any University society that interests them, including the postgraduate society.

Table 1.1 A timeline for postgraduate study and the activities and academic development associated with this level. This is necessarily a generic model and so events and research work will differ according to individual contexts, disciplines and institutions. In particular, where a postgraduate is studying part-time or does not have a continued physical presence in a department, some of the following points will be slightly different or even irrelevant. Personal development in thinking and writing will depend on the individual.

Sequence	Events and milestones	Focus of work activities	Development of thinking and writing
Pre-registration	Identifying research field, institution, supervisor	Scoping possible areas of research	Decision making
	Writing and submitting a research proposal	Writing the proposal	Basic review of research area and potential topics
	Registration for study	Completing forms	Mental preparedness
	Administration	Gaining access to IT and library facilities	
Year 1	Initial supervisor meeting	Setting up work space; discussing departmental and supervisor's policies for postgraduate study	Recognising probationary context
	Regular meetings with supervisor	Research planning	Learning to plan
	Literature search	Identifying literature	Learning to manage time
	Standardising information collected on source material	Organising records of sources; learning how to use referencing software if appropriate	Grouping resources thematically; thinking critically about content
	Literature review	Initial assessment of literature	Analytical and critical thinking
	Postgraduate training	Training in research or other practical techniques; safety induction as appropriate	Development of skills

Continued overleaf

Sequence	Events and milestones	Focus of work activities	Development of thinking and writing
	Research planning	Designing research strategy including methodological approach and equipment if appropriate	Clarification of research topic and related thinking
	Leading undergraduate tutorials or demonstrating	Tutorial, lab or field work (sometimes lecturing)	Planning ahead; thinking through assessment and feedback matters
	Seeking ethical approval	Writing application for ethical approval	Considering ethical aspects of your research
	Experimental work (if relevant)	Pilot work	Designing experiments; planning the necessary resourcing; analysing data
	Reading of literature and attendance at seminars and meetings	Note-making, listening and note-taking	Growing awareness of work in the field
	On-going literature searching and reading; critical appraisal of existing work	Maintaining a research diary/log/ notebook as record of work	Deeper thinking about the research field; beginnings of original thought
	1st year report submission for evaluation and examination	Responding to feedback from supervisor's weekly reports/meetings	Submitting weekly reports to supervisor
	Progress Monitoring Committee	Writing about and defending research ideas	Thinking more deeply about the research field
Year 2	Transfer to PhD regulation	Agreeing action plan for research and completion with supervisor	Developing experimental techniques
	Regular meetings with supervisor	Experimentation/study	Writing up draft results and conclusions
	Working within the research team	Contributions to group research projects	Thinking beyond personal research topic; expanding knowledge the field
	Continuing observational or experimental work (where relevant)	Carrying out work of high quality that might appear in the thesis	Collecting and analysing data

	Scheduled meetings with supervisor	Assessment of significance of data	Writing up draft results and conclusions
	Continuing observational or experimental work (where relevant)	Follow-up data collection	'Completing the story' by adding missing data or redesigning approach
	Departmental presentations	Preparation of presentations	Receiving appraisal and feedback from knowledgeable peers
	Progress Monitoring Committee	Submission of progress reports and evaluation of achievements thus far	Preparing draft material for thesis
Year 3 (and possibly 4)	Literature review	Return to literature for confirmation; refining and/or expanding ideas and carrying out further reading	Drafting of Introduction; contextualising your approach
	Final observational or experimental work (where relevant)	Data collection	Collecting and analysing data; drafting of notes for materials and methods; results; early conclusions
	Thesis writing proper	Attempting to write a near-final version, possibly using notes and early draughts as source	Writing first draft; thinking anew about approaches and results and their context
	Submission of draughts to supervisor	Writing to deadlines and attending meetings	Considering feedback on your work
	Final editing and proofing	Writing to deadlines	Checking for consistency and completeness; creating reference list
	Arranging for soft binding of thesis and submitting thesis	Printing 'final' version of thesis	Finding last-minute errors
	Viva voce examination	Defending your thesis and the work behind it	Making required corrections
	Publicising your ideas and findings	Writing poster presentation; conference paper; article for publication	Adapting to new or different styles of writing; responding to feedback from referees
	Graduation	Applying for jobs; revision of CV	Thinking about a future career

Developing your social life as a postgraduate

Here are some tips for getting involved:

- Find out about the postgraduate society and the events it organises.
- Locate the postgraduate common room within the department – or perhaps the room used jointly by postgraduates and staff – and visit it regularly to meet up with your peers.
- Discover whether there are any university facilities for postgraduates (some institutions have a postgraduate study area and/or a postgraduate club/bar) – and check these out.
- Explore the opportunities for sport and exercise.
- Join clubs that interest you.
- Take part in student union activities, including representation.
- Enquire about becoming an assistant warden of a hall of residence (with the possible bonus of living rent-free).

As a postgraduate, your financial situation will depend on what sort of funding underpins the project. In some disciplines, particularly science, the research group leader will already have applied for a studentship or negotiated a quota studentship from a funding body or research council. These studentships normally include a full financial package intended to cover university fees, materials, some travel funding for conferences, and a stipend (payment) to cover living expenses for the student. Research council grants are standardised (with London weighting, if applicable), but some industry- or university-funded positions may pay better. You may be able to balance your budget by carrying out teaching duties (Ch 13) or minimising accommodation costs by acting as a hall warden. Having a job in the evenings is technically possible but usually is frowned upon as it will limit significantly both your study time and energy reserves.

DECIDING WHAT TO STUDY, WHERE TO STUDY AND WITH WHOM

In essence, there are two types of postgraduate project:

1 Those where the research aims have been defined in some detail as part of the process of gaining funding for the studentship.

2 Those where personal or external funding is available for a studentship, but the precise project has not been defined, or only a general subject area is suggested.

Both types may be advertised in relevant academic publications or online. In addition, many departments will accept independently funded postgraduates who apply autonomously.

The first 'closed' kind of project is more common in science-related disciplines. Choosing which of these positions to apply for will depend on factors such as:

- the attractiveness of the project;
- the reputation of the supervisor (who is often specified);
- the reputation of the institution;
- the stipend and other financial issues;
- personal desires, such as a wish to move (or not to move) to a specific location.

In many cases, the topic may seem rather esoteric and possibly narrow. You may need to carry out some research to find out what it might involve and where it might lead. You should be encouraged, however, by the fact that the proposal is likely to have been through a rigorous peer review process where its relevance, topicality and chances of success will have been assessed.

The second 'open' type of project occurs more frequently in arts-orientated PhD programmes. Here, you would be required to identify a specific topic and possibly frame a research proposal (**Ch 3**). Sometimes finding a supervisor and/or a source of funding are tasks that fall to the student, sometimes the supervisor and/or funding are allocated by the host department. The supervisor is generally conducting research into a similar or related field.

In many ways the student–supervisor relationship is one of the most important aspects of postgraduate study. You may need to assess whether you feel compatible with a potential supervisor, and *vice versa*. This is necessarily a personal matter. **Chapter 10** details the nature of this partnership and if you need to select a supervisor, this may help you develop a personal set of criteria. One of the best ways to find out about supervisors is to seek the opinion of those already studying in the department if possible.

Factors to take into account when framing a project or deciding on the suitability of a project

Make sure you are making an informed choice by doing background reading, speaking to a range of staff and students, and asking the right questions when you have the opportunity.

You may wish to consider the following:

- **Your personal level of interest in the topic.** This will help to motivate you through three or more years of study and when things aren't going well.
- **The underlying problem that the research aims to tackle.** This needs to satisfy any inclination you have for 'applicability', or convince you that the topic is interesting in its own right.
- **The research approach.** This may seem easy or hard; up-to-date or established-but-uninteresting; risky or secure in providing results; innovative or tried-and-tested. Decide which options best match your personality and ambition.
- **Availability of resources or experimental material.** To make good progress, you will need ready access to research sources or experimental data, or both.
- **Feasibility.** A highly interesting project might be thwarted by time constraints, sheer difficulty or methodological problems.
- **Depth.** You will develop more advanced skills by tackling a more difficult subject.
- **Quality of support and supervision.** You will need to get on with your supervisor, but this presupposes that they will be available to meet you. A noted authority may lack the time to see you as frequently as you might wish.
- **Impact on your CV and career options.** This may not be obvious at the outset, although it should be possible to assess the types of 'sellable' skills you will be able to develop.

Having multiple supervisors

There are a number of scenarios where you might have more than one supervisor. They might have complementary expertise relevant to your project, or one may be performing a mentoring act for another who does not yet fulfil the university regulations for solo supervision, which usually requires experience in the role as a co-supervisor. **Throughout this book we will use the term 'supervisor', while acknowledging that on occasion, this might properly be 'supervisors'.**

THE APPLICATION PROCESS

The application process for 'closed' projects is very similar to applying for a job: the PhD post is advertised by the university in the appropriate publications. These announcements are frequently released between January and the summer period for the forthcoming academic year, so start looking early. Research council funding for postgraduate study is awarded to individual institutions and students seeking funded places must apply through their chosen institution and not directly to the relevant research council. Further information is available on the websites of each of the research councils. In general, the minimum stipulated requirement for a higher degree course is a 'good honours degree'. This usually means an upper second or better – although criteria may vary with different admissions tutors, and the popularity of the project area. Normally you will be asked to submit your CV including your expected degree classification if you have not already graduated. You may then be short-listed for an interview. The format of this will vary with institution but generally consists of an initial, formal interview before a postgraduate committee, frequently a panel of three academics.

What might they ask me at interview?

Be prepared to answer questions of the following types:

- Why do you want to do a PhD?
- What are your future career goals?
- What is your understanding of the general subject area?
- Why do you want to pursue this particular topic?
- Can you outline your current research (Honours project) or previous research projects?
- What do you see as the key research questions?
- How would you approach this research?
- Would you enjoy living in the area for the following three or more years?
- What are your hobbies/interests outside of your academic studies?

Whatever procedure is required, you can assume that you will be asked for a reference giving an account of your suitability to become a research student. This should be written by someone who knows you

well and can testify to your performance academically and your level of interest in the area of work you wish to pursue. It would be wise, therefore, to ask a member of the academic staff in your most recent university or college if they would be willing to do this for you. If the institution you are applying to has a special form for references then be sure to give that to your referee as soon as possible to allow them time to complete it. Otherwise, just ask for either a sealed or an open reference and include it with your application letter as noted above.

As well as a formal interview you will normally have a more informal chat with your potential supervisor. This is an ideal opportunity for you to ask questions and for you both to get a feel for whether or not you can get along together, both professionally, and on a personal level. After all, you are about to embark on at least three years of work together, so it is very important that you get along. You should then be informed shortly after the interview(s) whether or not you have been successful in gaining the position. If you are unsuccessful, do not be disheartened, as competition for studentships is often high – instead, view the interview experience positively as a way of gaining confidence in answering questions about yourself.

APPROACHING POSTGRADUATE STUDY IN THE RIGHT FRAME OF MIND

The competition in research is fierce. You should be in no doubt that working for a doctoral degree requires immense commitment and the time requirements are very demanding. You will be stretched intellectually and as well as strong perseverance and determination, you will need to be organised and efficient. Aspects of your non-working life will probably change.

At the same time, it is a privilege to be allowed to enter the world of research. You will already have demonstrated that you have the necessary ability, but this sheltered environment will provide you with opportunities for contact with like-minded and similarly qualified individuals; the chance to work with and learn from noted authorities, some of whom will be authentic geniuses; and the space, time and working conditions to test your own mind to its limits.

To be successful, and in particular to complete your studies on time, you will need to be clear about your overall aims and the routes required to achieve them. It will not be possible to map out all your

work accurately and in detail, otherwise it would not be worth doing. Nevertheless, you should try to anticipate your training and skills needs; you should be proactive in arranging the necessary meetings, visits and in gaining access to research materials and facilities; and possibly most important of all, you will need to understand the need for 'closure' (most research is, after all, open-ended) and willing to accept the compromises required for completion in terms of a written thesis.

Most PhD students experience highs and lows as they progress through what is necessarily uncharted territory. It will be important to remain upbeat during episodes of apparent frustration or disappointment (Ch 11). Recognising this aspect of research life and remaining well-motivated is a vital key to successful postgraduate study.

ACTION POINTS

1.1 Consider your strengths and weaknesses in relation to the challenges of PhD research. Showing awareness of these at interview might be beneficial to your cause. This self-knowledge may also help you to take anticipatory action, for example, by signing up for additional training (Ch 5).

1.2 Review the timeline for postgraduate study (Table 1.1) and create a set of targets for yourself. Think about where you would like to be in your research at different times. The majority of PhDs are completed in a hurry at the end of the studentship period, and sometimes beyond (often, importantly, once the funding has ended). Although research work is necessarily unpredictable, resolve to be among the minority who have planned their work carefully and given themselves the best possible chance of completing on time, avoiding a last-minute rush.

1.3 Get yourself organised. Regarding the points made in 1.2 above, one of the keys to meeting targets is being organised in your work, so ensure your filing (both computer and hard copy) is in good order right from the start – and periodically review its status, giving it an overhaul from time to time. Ensure that you always keep a back-up of all your files.

2 PRINCIPLES OF POSTGRADUATENESS

How to approach study at this new level

How does research at PhD level differ from that carried out for an undergraduate degree? Gaining an understanding of your new level of study is important to ensure your efforts meet your supervisor's and examiners' expectations. This chapter provides insights into your new study environment; your role and those of others; and the challenges of being a researcher.

KEY TOPICS

- → Recognising the challenges and expectations of postgraduate study
- → Understanding the criteria for the award of a PhD
- → Joining the academic community

Making the step up to doctoral study may have been an easy decision, or it may have been one that required prolonged thought. You may have been confident that you were ready for this level, or you may have thought anxiously about whether you were ready for the inevitable academic challenges. Even if you haven't thought deeply about this matter at all, there is merit in considering what lies ahead and what will be required of you. Several different sources will exert an influence, including:

- The academic community, as represented by the University and your examiner(s) – for example, what will they require of you in terms of standard of work and the presentation and examination of your thesis?
- Your supervisor – for example, what would he or she like you to achieve, perhaps as a contribution to a wider research theme?

- Yourself – for example, what are your personal goals in terms of expanding your understanding and developing skills?

This chapter deals primarily with the requirements of the academic community – arguably the most universally significant; expectations in the other areas will depend on your circumstances; they are covered particularly in **Chapters 1**, **5**, **10** and **33**.

Gaining expertise

One way of describing your achievement at the end of a postgraduate degree is that you will have carried out a sufficiently extensive and deep investigation to have become one of the world experts in your particular subject area. The subject may be narrow, and in fast moving-topics, the expertise temporary, but this description provides an excellent overarching goal for your studies.

RECOGNISING THE CHALLENGES AND EXPECTATIONS OF POSTGRADUATE STUDY

The challenges of postgraduate research will differ depending on your field and topic within it. Most people who have successfully completed a doctorate would acknowledge that they had to develop old skills as well as acquire new ones, especially in the earlier stages of postgraduate studies (**Ch 5**). Your research may lead you into new fields where you have to adopt new approaches or techniques (**Chs 17–24**). You may need to learn how to use sophisticated specialist software to help with data analysis (**Ch 23**). You will certainly need to develop the scholarly writing expertise expected at postgraduate level (**Chs 26–30**).

Your institution will require certain things from you, including:

- the dedication of time and energy to complete your project on time;
- the application of intellectual integrity to your research task so you conduct your research honestly and ethically;
- a contribution to the collegiate environment of your institution, possibly through the teaching activities involved in tutoring or demonstrating or participating concurrently in other research projects.

Your supervisor will anticipate, in addition, that you can:

- organise your time to meet the demands of the research;
- participate in purposeful meetings to review the work in progress;
- approach your studies with a questioning and open mind;
- analyse and critique work in your field;
- analyse and critique your own work;
- demonstrate original thinking;
- be productive in the conduct of your research and related writing.

In return, your own commitment to the research process will lead to some expectations of your chosen institution, for instance, that:

- you will be able to work under an expert in the field, who will provide suitable supervision;
- you will be allowed (within reason) to do your research in your own way but under the tutelage of your supervisor;
- you will be provided with opportunities to consult with your supervisor on a regular basis; and that
- you will have access to the facilities to enable you to conduct the research professionally and thoroughly.

As a graduate, you may have carried out a research project or dissertation at undergraduate honours level; moreover, having been accepted for postgraduate studies, it is likely that you will have performed well in that exercise. The experience will certainly have given you a flavour of what to expect in a PhD. However, the criteria for postgraduate work are generally more rigorous than work at undergraduate level. Details are naturally discipline-dependent, but in general, your research will be expected to be:

- More extensive. You will have a longer period to carry out your investigation, so both your investigation and its write-up can and should be wide-ranging, encompassing all relevant aspects of your field and possibly beyond.
- Deeper. In one to three full-time years of study (or more), you will have the time and resources to look into your topic in greater detail and to investigate each element fully.
- Original. You will have the opportunity to display innovation in the way you tackle the project, whereas at honours level you might been on safer ground, perhaps following the approach of a previous study.

- More rigorous. Essentially, the outcome of your research needs to be of publishable standard. It must have a theoretical underpinning and use appropriate research methodologies. This means that the methods must be reliable, the results repeatable (in the sciences), the analysis wholly appropriate and the conclusions valid. A judgement on this will be carried out by an authority in the area (the external examiner) or, if you submit parts of your thesis to a journal, by academics with knowledge of your subject (see **Chs 31** and **32**).

Another way of approaching this matter is to consider the different aspects of study, including the relevant skills that are required. Table 2.1 provides an example listing of expectations under five relevant headings of this type. This should provide a benchmark with which you can judge both your present status and later progress.

UNDERSTANDING THE CRITERIA FOR THE AWARD OF A PhD

As an undergraduate, you will probably have been familiar with 'learning outcomes' and 'marking criteria' related to your courses. These are normally published in the course handbook and would have defined what the academic staff expected you to be able to achieve, and, consequently, their benchmarks for assessing your assignments and exam papers.

Due to the widely differing nature of each PhD project, and the necessarily 'unexpected' outcomes of this type of research activity, there can be no similar detailed information at this level. However, your completed work will be assessed by an experienced external examiner and, normally following an oral exam (often referred to as the '*viva*' which is short for the Latin '*viva voce*', meaning 'by the living voice'), they will use their professional judgement on whether to recommend the award of the relevant degree (**Ch 31**).

Universities differ, but the broad criteria used in this judgement essentially follow the expectation that your thesis should be 'novel, reliable and personally owned', that is, showing original research, be of publishable quality and be all your own work unless the contribution of others is acknowledged. The different sections of the thesis (**Ch 28**) provide opportunities to verify that you have satisfied these criteria, as summarised in Table 2.2.

Table 2.1 A description of the level of study expected in postgraduate research. Taken from the 'level descriptors' published by the Scottish Credit and Qualifications Framework (***www.scqf.org.uk***, accessed 16 June 2012). In that system, doctoral studies are placed at Level 12, with Level 11 covering Masters and Level 10 undergraduate honours. This source allows further direct comparisons to be made between expectations for undergraduate and postgraduate work, should you wish to make them.

Aspect	Postgraduate (doctoral level) descriptors
1 Knowledge and understanding	Demonstrate and/or work with: • A critical overview of a subject/discipline, including critical understanding of the principal theories, principles and concepts. • A critical, detailed and often leading knowledge and understanding at the forefront of one or more specialisms. • Knowledge and understanding that is generated through personal research or equivalent work that makes a significant contribution to the development of the subject/discipline.
2 Practice: applied knowledge and understanding	• Use a significant range of the principal skills, techniques, practices and materials associated with a subject/discipline. • Use and enhance a range of complex skills, techniques, practices and materials at the forefront of one or more specialisms. • Apply a range of standard and specialised research/equivalent instruments and techniques of enquiry. • Design and execute research, investigative or development projects to deal with new problems and issues. • Demonstrate originality and creativity in the development and application of new knowledge, understanding and practices. • Practise in the context of new problems and circumstances.
3 Generic cognitive skills	• Apply a constant and integrated approach to critical analysis, evaluation and synthesis of new and complex ideas, information and issues. • Identify, conceptualise and offer original and creative insights into new, complex and abstract ideas, information and issues. • Develop creative and original responses to problems and issues. • Deal with very complex and/or new issues and make informed judgements in the absence of complete or consistent data/information.

4 Communication, ICT and numeracy skills	Use a significant range of advanced and specialised skills as appropriate to a subject/discipline, for example: • Communicate at an appropriate level to a range of audiences and adapt communication to the context and purpose. • Communicate at the standard of published academic work and/or critical dialogue and review with peers and experts in other specialisms. • Use a range of software to support and enhance work at this level and specify software requirements to enhance work. • Critically evaluate numerical and graphical data.
5 Autonomy, accountability and working with others	• Exercise a high level of autonomy and initiative in professional and equivalent activities. • Take full responsibility for own work and/or significant responsibility for the work of others. • Demonstrate leadership and/or originality in tackling and solving problems and issues. • Work in ways which are reflective, self-critical and based on research/evidence. • Deal with complex ethical and professional issues. • Make informed judgements on new and emerging issues not addressed by current professional and/or ethical codes or practices.

Table 2.2 A mapping of basic thesis components to the criteria of novelty, reliability and ownership. Ticks indicate parts of the thesis where you will have an opportunity to demonstrate that you have satisfied the criteria. Not every thesis will incorporate all these components (Ch 28).

Thesis component (where present)	Criteria for successful postgraduate work		
	Novelty	Reliability	Ownership
Declaration			✓
Acknowledgements			✓
Introduction	✓		
Materials and methods		✓	
Results		✓	
Discussion		✓	
Conclusions	✓	✓	
References			✓

What does 'publishable' mean?

This means that if you submitted your work in the relevant format and writing style for a typical academic journal in your subject area, it would be likely to satisfy the criteria for publication if space allowed. Each journal publishes its expectations for submitted work covering both format and quality of work and it is worth studying some of these outlines for your subject area.

- The requirement for novelty. This ties in with the expectation that the work is publishable due to its originality. Your thesis needs to present a new contribution to the literature in your field, advancing the academic community's knowledge and understanding. You will have opportunities to establish this in the Introduction and Conclusions parts of the thesis, where, amongst other things, you should place your work in its academic context and explain why it is novel.
- The need for reliability. Here, definitions differ slightly among disciplines. In the sciences, a key meaning is that, potentially, your work must be capable of repetition by a 'competent technician', that is, someone with similar skills to you. This explains the emphasis on detail in the Materials and Methods section, and for information on replication and statistical analysis to be provided in the Results section. In many non-sciences, the emphasis is rather that the 'position' you arrive at must derive from verifiable sources and follow a logical argument.

Valuing and overcoming perfectionism in research

An inherent paradox in research is the fact that it requires and rewards perfectionism, yet this very quality is an obstacle to completion and closure of a research project. For example, perfectionism and rigour are required in the accuracy of reporting and language (**Ch 26**); in conducting experiments or making accurate observations (**Chs 22–24**); and in tracking down and acknowledging all possible sources (**Chs 7**, **8**, **20**, **21**). Anything else will be heavily criticised. However, almost by definition, research is never complete: there are rarely definitive 'answers', and there is always the need for further study. Where you draw a line under your work is often dictated by time pressures rather than a natural end point. Compromise will be required in terms of imprecise methods, incomplete data, missing information and uncertain conclusions, and that cuts against the grain of perfectionism. The mistake is in thinking that it can possibly be otherwise.

- Demonstrable ownership. Partly due to its specialised nature, research degree work is vulnerable to plagiarism and the possibility of unacknowledged outside help. A thesis is not written under exam conditions, and others may have helped you significantly. Further, the examination committee may not always know in detail about other work carried out in your field and be unable to judge unerringly whether ideas or data have been copied from others. For this reason, you will be asked to write and sign a declaration (**Ch 30**) and be expected to follow the academic conventions of citation and referencing to acknowledge the influence of other authors (**Ch 20**). In part, the purpose of the *viva voce* exam (**Ch 31**) is to allow you to demonstrate that you understand and can explain your thesis as an indication that it was indeed your own labour.

'All my own work' – the thesis declaration

Most university regulations for postgraduate degrees state that there should be signed declaration at or near the start of a thesis (**Ch 28**), affirming that, unless otherwise stated:

- the candidate is the sole author of the thesis;
- all references cited have been consulted by the candidate;
- all the work in the thesis has been done by the candidate;
- the work has not been previously accepted for a higher degree.

If the thesis is based upon joint research (sometimes the case in the sciences), it is also expected that the nature and extent of the candidate's individual contribution is defined.

There is also a technical requirement to submit your thesis in the expected format and binding (**Ch 30**) – it might have to be resubmitted if the examination committee decides that it fails to meet these conventions.

JOINING THE ACADEMIC COMMUNITY

As you progress in your postgraduate studies, you will sense that you are gradually becoming a part of an academic community. People will be interested in your work and thoughts. They may wish to collaborate, to ask for your help or to debate issues with you. Some may influence your thoughts hugely. Some will become life-long friends.

However, as with any other community or society, becoming integrated is a two-way process. You will need to reach out in similar ways to your peers, perceived superiors and external authorities. Your initial shyness will soon disappear when you realise that your fellow students probably have the same apprehensive feelings as yourself and that even crusty old professors have a soft human side (sometimes).

Ideas for linking with other researchers

- **Show an interest.** Ask about their work and read up a little about it if necessary.
- **Find out others' views.** Ask what they think about the main issues in your own work.
- **Share your own views.** Be willing to reveal your own thoughts and/or results.
- **Read others' papers.** Become informed about their interests and ideas.
- **Attend seminars and ask questions.** Find links to your own studies.
- **Research alongside others when you can.** You might pick up useful tips.
- **Spend time in the common-room.** Take part in the intellectual and not so intellectual banter.
- **Attend social events.** Get to know your colleagues' personalities.
- **Email or write to the authorities in your subject.** Seek out their views.
- **Attend training programmes.** See if you can learn from the approach others are taking.
- **Attend conferences.** Present your own work; meet other like-minded people.
- **Explore opportunities for collaboration.** Try to work with others and use their facilities.
- **Create a research blog or social media site.** This might help you to make and maintain contacts.

One important aspect of postgraduate study is that it offers you a 'taster' of what it might be like to follow an academic career. For example, it will allow you the chance to find out whether you might be suited to university-level teaching (Ch 13). It might also provide a springboard to launch a professional research career.

As a novice member of an academic community, you will be able to observe other academics in action; gain a sense of how competitive the academic life can be; and see from the inside how an academic department actually works. If it does seem to suit you, then you can try to enter academia, either directly or, more likely, by applying for a postdoctoral position (Ch 33). On other hand, you may decide that working in a university, research institute or the development section of a company is not for you. If this is the case, you can make a break and move on elsewhere after the postgraduate study period.

What is a post-doc?

Post-doctoral (post-doc) positions occupy a place between a PhD studentship and a lectureship (or full-time research post). They are generally untenured, and based on a three-year salaried contract. Post-doc positions offer a chance to use or extend your expertise, build a publication base and make new contacts. They are often regarded a staging post on the way to a research or lecturing career.

ACTION POINTS

2.1 Construct realistic aims for your research and discuss these with your supervisor. This may indeed be a requirement of your university's progress monitoring system or a required aspect of a research proposal. Such research aims, however, should always be flexible. They should be modified in the light of experience. They need to become more realistic and achievable the further into your studies you go.

2.2 Review your university's requirements for achieving a postgraduate research degree. Do this at the outset. Do not be under any illusions about what you need to accomplish.

2.3 Try to become more aware of your personality traits. How might these affect your research progress? Often, personality tests are offered as part of the postgraduate training programme, but they are also available online or via your careers centre. The results should not be considered definitive, but they may give cause for reflection.