
Writing a research report, dissertation or thesis

P. CLEATON-JONES

More and more medical and dental postgraduate qualifications require that research be undertaken, followed by the writing of a research report, dissertation or thesis. Regulations vary from university to university but, for clinical specialist training, clinical work and course examinations are generally combined with a short report on a research project. This is usually about 30 - 40 pages of double-space typing describing a single experiment, and is of a standard required for a manuscript submitted to a refereed scientific journal for publication.

A dissertation is a longer document required for an M.Sc. degree. It is often two to three times the length of a research report and comprises several experiments. Both the research report and dissertation require that familiarity with scientific methodology rather than original research findings be shown.

The next stage is the thesis which is required for a Ph.D. or M.Ch. degree. It is about twice the length of an M.Sc. dissertation. Work emphasis is different, however, since although familiarity with scientific method must be shown, original

research with a definite contribution to knowledge is required.

This paper describes one way of writing these documents. There are of course other ways, therefore postgraduate students should look around to see which system suits them best. Remember, writing is hard work and the more one writes, probably the harder it becomes as self-criticism increases!

There are three golden rules.

- Have something to say.
- Be systematic about your writing.
- Make your writing flow.

If there is no message, if the research has been unsuccessful, if the objectives have been poorly defined, then there is no point in writing. However, if all has gone well, then begin to write.

How does one begin? By sitting down and getting on with it! Professional authors sit in front of their typewriters or pads for a set period of time every day. They don't wait for the mood to hit them but discipline themselves to work. In the same way, to write research reports it is necessary to work systematically. This means one must set aside a period of time for writing every evening with perhaps a break

at weekends. Each regular writing period need not be long but ultimately will add up to a considerable amount of time. For example, 1 hour every night for 5 nights during the week is 5 hours work; add to that 2 hours on Saturday or Sunday and already you have 7 hours of writing in a single week. As one becomes skilled, more and more work will be done in that time.

Realize early on that your writing must flow, in other words, one idea must lead on to another, one section must lead on to the next. Often the early attempt to write a research report is very disjointed; don't despair, this is quite normal, but ultimately the work must flow.

How does one begin to write a research report? In some South African faculties research protocols have to be presented before the research can be undertaken; this is really the beginning of the report. The layout of a research protocol is very similar to the essential layout of a research report. For example, there are sections dealing with background reading, the objectives of the research, and the experimental method to be used.

The first practical point to consider is the house style of the university. Many universities in the RSA and elsewhere have specific style manuals which detail exactly how the research report should be written for their particular university. If your university has such a style manual get a copy and study it carefully. If your university does not

P. CLEATON-JONES, B.D.S., M.B. B.Ch., Ph.D., D.T.M. & H.,
D.P.H., D.A. (S.A.)

Professor of Experimental Odontology

Director, MRC/University of the Witwatersrand

Dental Research Institute

have such a manual, study examples of the same type of report as yours in the library before beginning to write.

The next thing one should do is buy a good quality leverarch file. This is a file, approximately 5 cm deep with a lever that enables one to compress the material therein. Into this file will go everything about the report writing that one can possibly collect.

Layout of initial pages

So much for general remarks, let's begin with what you should do with **your** research report. First of all write out a title page with, on the top of the page, the approved title of your research. Under this place your full name and at the bottom of the page something like: 'A research report (dissertation for an M.Sc. or thesis for a Ph.D.) submitted to the Faculty of XXXX of the University of YYYY in fulfilment of the requirements for the degree of ZZZZ'. If the degree is one in which there are courses and examinations then the wording may be 'in partial fulfilment of the requirements for the degree of ZZZZ'. Under this will be the town in which the university is situated and the year of submission. Now, having done this, insert the title page into the very front of the leverarch file and . . . you have already begun to write the report!

The next page is a declaration which should be something like 'I, (here you put your name), hereby declare that this research report (dissertation or thesis) is my own work and has not been presented for any degree of another university'; this is signed and dated, and below it is written the place where the work was carried out. For example, 'the work reported in this dissertation was performed in the Department of Medicine, University of the Witwatersrand, Johannesburg'.

On the next page is a dedication to a member of the family, a parent, a sweetheart, a teacher or anyone else you wish. The dedication is followed by an abstract which is a summary of the entire dissertation. Just place a blank page headed 'Abstract' in the file for the moment.

At the completion of your writing the abstract proper will be written.

Now move on to another page and here should be listed any publications which have arisen from material presented in the dissertation. It is not a bad idea to show that you have already published some of your research in refereed journals. This shows your examiner that acceptance of your work by a reputable journal has already placed a certain stamp of approval on the quality of the research. Also, it does give him an idea of your productivity and how long you have taken to complete the research report. The layout of the papers here should be similar to your reference layout.

The next page contains acknowledgements to all who have guided you or assisted you in any way. By this time a fair number of pages have been written and you are well on your way to completing your research report.

Next, we come to the table of contents. When you begin to write up it is not easy to know exactly how this should be laid out. What you should try though, is to do a mock layout listing the probable chapters in your report; from time to time as the writing continues you can alter these as necessary. Chapter 1 can be labelled Introduction; Chapter 2 — Materials and Methods; Chapter 3 — Results; and Chapter 4 — Discussion; and, if you wish, Chapter 5 — Conclusions. Here a useful numbering system is one in which the first number is that of the chapter, followed by a full stop then the number of the section within that chapter. In Chapter 1, for example, 1.1 could be headed Historical review, 1.2 could be a review of previous research reported, and 1.3 might be the aims of the investigation. Each of these sections can be further subdivided using three numbers: 1.2.1 could be early history, 1.2.2 early experimental work, 1.2.3 recent investigations, and so on. This may be taken one step further so that four numbers are used 1.2.1.1 and 1.2.1.2, etc. Beyond this the numbering system becomes clumsy and then one should use the conventional a, b, c, etc.

To subdivide the sections consider whether each step in your

writing stands on its own. If it does, number it accordingly. In the chapter headed Materials and Methods, for example, one may have an introduction explaining the procedure to be adopted, that is, that general materials and methods will be described in the chapter and where necessary specific methods will be included in subsequent chapters. One may, for example, list species studied (even if only to say whether the species is man); general features of operative techniques; killing of experimental animals; histological techniques; radiographic techniques; computer analysis; statistical analysis; experimental design, and so on. Do similar layouts for your results which may once again be subdivided into introduction, materials and methods, results, and discussion, and then finally subdivide your discussion. At this stage this is only a rough guide but at least gives you some idea of layout.

Table 1 summarizes the initial pages of the research report and the order in which they might appear.

TABLE 1. SUMMARY TO INITIAL PAGES

Title page
Declaration
Dedication
Abstract
List of publications and verbal presentations
Acknowledgements
Table of contents
List of figures
List of tables

Main contents

Put dividers made of cardboard, paper or whatever you like, into your file and label the divisions — Initial pages, Chapter 1, Chapter 2, Chapter 3, and so on, ending with References. Behind each of these you will insert reprints, writings or whatever, to help you to write the research report. Initially you will be at a loss for what to put into these sections; later it will be much easier to fill them. Proceed to each section in turn. Consider, for example, a subsection of materials and methods, such as species studied;

take a piece of blank paper and write down your thoughts. It doesn't matter if it's not good prose, just write down how you feel at the time. Learn to carry a piece of paper and pencil wherever you go and when you have an idea jot it down so that you may put it into the relevant section when you reach home. Keep doing this with each of the chapters. In time, you will discover that you have a fairly sizeable report that you can begin to reorganize more formally.

The best place to start your more formal writing is with the materials and methods chapter because you will be familiar with exactly what did and will therefore be able to write this out in detail. Put yourself in the place of another researcher or an examiner trying to determine exactly how an experiment was done so that whoever reads the report will be able to repeat it. Give sufficient details of the experiment.

In writing the results section, you will probably find it easiest to first make tables of results you have obtained. Also, it is often useful to print photographs of techniques or histological sections and to place these on separate blank pages for insertion into the relevant section. With all this material you may now start to organize your thoughts more logically.

Organizing drafts

My next bit of advice is that you buy a second leverarch file and organize it in the same way as the first with the various subdivisions you have devised. Into this file will go a neater copy of the first draft. You will begin it once again by writing out a neat copy of the title page, dedications, etc., followed by a more formal writing out of your introductory review from your protocol notes; this review should by now be fairly detailed. Write up materials and methods with as much detail as you can and the results section with whatever results you have to hand.

At this stage it is important to start organizing your references at the back of the file. You may do this on pages headed A - Z or, what is

more practical, write them on cards or enter them into a computer.

Once you have completed a reasonably tidy draft in this second file remove the material from the first file, begin rewriting again, the third draft now, and place this into the original file. Keep two files going with one file always containing the most recent updated version of the report.

A few more words of advice may be useful here. From the time you have completed the first really good draft, get into the habit of making a photostat or carbon copy of what you have written. Place this for safe-keeping in an envelope or another file and store it somewhere other than where you usually work. For example, store one copy at home, one at the office or at your mother-in-law's home, or somewhere else. Whatever you do, do keep a duplicate copy. Manuscripts are so easily lost, stolen or mislaid; this can be really disastrous.

Supervisor's comments

Once the third draft is written, it is time to talk to your supervisor, to show him what you have done and to ask for his comments. Probably he will not criticize in detail what you have presented but will look at the basic organization and flow of the report to see where you are going. He may give you some broad hints on how to proceed further, some advice, perhaps on style, and request you to get on with the next draft. In doing the next draft the previous draft is, of course, removed from one file and replaced with a new neat version and so on. Note that you do not have to rewrite every section of every chapter for every draft. When something is well-written get into the habit of using a pair of scissors to cut out the well-written version which can then be fixed onto a blank page using clear tape (Scotch magic tape; 3M Co.); this is adhesive tape which becomes almost invisible when placed over writing and can be written on.

Illustrations

Once you have reached the fourth draft you are well on the way to

completion, but some things remain to be done. Begin thinking about your photographic layout by choosing from the initial prints the photographs you wish to include. Take photographs to fill voids that have now become obvious and remove others that are superfluous. Try to decide on the final size and format of the pictures and whether any of the prints should be cropped to highlight certain points. Once these points have been settled arrange to have the necessary number of copies made; these should be carefully filed away. It will later be a simple matter to add them to the draft.

Should one use colour photographs or black and white prints in the research report? This is a matter of choice for authors who can please themselves. In my experience black and white prints are generally more satisfactory and certainly cheaper. The only exception I have found is that operative procedures often look better in colour because it is easier to distinguish between shadow and blood. Histological pictures on the other hand are seldom successful as colour prints and should rather be black and white.

Assuming that all is going satisfactorily, that the report is progressing well, your photographs are prepared, and the references are complete and have been checked, don't forget to give adequate notice to your faculty of the likely completion date so that the necessary arrangements can be made for examiners.

Eventually the great day will come when the research report is ready for binding. My advice is to use interleaving where photographs are going to be inserted, and to place the photographs into the research report only after binding; this will prevent the bound report from gaping open at the edge. There are numerous types of double-sided adhesive tapes which may be used for this.

A few words of wisdom

Firstly, writing dissertations is extremely difficult, so read as many books as possible on how to write scientific and medical papers. Some

suggestions are the works of Calnan^{1,2} Huth³ and Lock.⁴

Secondly, writing a research report is a strain on family life . . . try to understand that not everybody in the family is as dedicated or as obsessed as yourself about your report. Try not to lose your temper with them too often and try to spend some time with them.

Thirdly, writing is a strain on the staff of the research department and on your supervisor. People writing research reports tend to live with the problem constantly and often are not aware that other people have

other problems and other interests. Try to remember that while the research report may be your whole life while it is in progress, it is not necessarily so for the other members of staff.

Fourthly, recognize that you are going to feel depressed, since from time to time things will go badly. This is not as bad as it seems, but is extremely common. Grin and bear it! A useful tip is . . . whenever the report appears to be getting on top of you, stop work and let it lie fallow for a few days before returning to it. In doing so you will find it

much easier to pick up the threads and will not be overwhelmed by your project.

Good luck!

REFERENCES

1. Calnan J, Barabas A. *Writing Medical Papers: a Practical Guide*. London: William Heinemann, 1972.
2. Calnan J. *Coping with Research*. London: William Heinemann, 1984.
3. Huth EJ. *How to Write and Publish Papers in the Medical Sciences*. Philadelphia: ISI Press, 1982.
4. Lock S. *Thorne's Better Medical Writing*. 2nd ed. London: Pitman, 1977.

Correspondence / Briewerubriek

(continued from page 35)

Emergency Medicine/Noodversorging

To the Editor: May I be permitted to add to the editorial of the October 1985 issue of the *S.A. Journal of Continuing Medical Education*, in which the field of emergency medicine was so ably highlighted, just one short paragraph:

As 'n meer formele kwalifikasie op die gebied van noodversorging bied die Kollege van Geneeskunde van Suid-

Afrika nou 'n nagraadse diploma, die Diploma in Primêre Noodversorging, aan waarvoor die eerste eksamens gedurende September/Oktobre 1986 afgeneem sal word.

G. O. F. Lippert

227 Silver Oak Ave
Waterkloof
Pretoria
0181