

The Environmental Building Group
at
The University of Plymouth

The self learning guide to a successful dissertation

Paul E Murray BSc FRICS
Head of Building Programmes

The intention of this brief research study guide is to supplement your Dissertation Brief and to empower you to produce a sound academic Dissertation submission. This guide only begins to provide you with the tools needed to pass the Dissertation module - the most important module in your degree programme. As you would expect in a final year honours degree module, you will be expected to work independently and to fill gaps in your knowledge as necessary on your own initiative.

What this guide does to some extent is to provide all students who are being supervised by different staff with a "level playing field" in respect of basic research guidance. It is essential however that you delve into more depth by utilising the key text and additional texts as appropriate.

I have included within this guide some basic information on the use and development of surveys and questionnaires, as many built environment Dissertations utilise this approach

Good luck

Paul E Murray BSc FRICS
Head of Building Programmes
September 1999

Key text

Naoum, S. G. (1998) Dissertation writing for construction students Oxford Butterworth Heinemann

A brief selection of additional texts

Fellows R. Liu A. (1997) Research methods for construction Oxford Blackwell Science

Bosworth D.P. (1992) Citing your references: a guide for authors of journal articles and students writing theses or Dissertations Exmouth Underhill Press

Hampton E. (1994) How's your Dissertation going? Lanc. University

Allison B. (1997) Students guide to preparing dissertations and theses Kogan page

1.0 Do I understand the basics?

1.1 Do I know what a Dissertation is?

More to the point - what is not a Dissertation?

It is vital that you understand fully the nature of the work you need to submit as your Dissertation

So, is a dissertation any of the following:

A general review of a subject?

A story?

A case study review?

An in depth review of literature / text books

A dissertation is an independent research study designed to stretch your intellectual and technical skills. It involves the setting of a hypothesis, and the proving or disproving of the hypothesis using secondary research (literature review), primary research (laboratory testing, surveys, etc.), and the synthesis and critical evaluation of research data.

1.2 Do I know what a hypothesis is?

A hypothesis is a theory, or a supposition.

For example:

“The employment of professionally qualified Construction Managers reduces conflict in large scale construction projects”

It may help you if you realise that a hypothesis could be turned around into a question

“Can the employment of professionally qualified”

The hypothesis needs to be narrowly focused - too many final year students have difficulty because their research focus was too broad and general.

An example of a broad topic / hypothesis is:

“Is construction sustainable?”

or

“What value does disabled access legislation have to the to the seriously disabled?”

In both the above cases no undergraduate student could possibly expect to realistically prove or disprove either hypothesis with any validity. Contrast the above with the following example:

Surveyors are failing to meet their obligations as designers under the CDM Regulations when specifying remedial preservative timber treatments”

Can you see that seeking the right question to ask, the right hypothesis to respond to is the key to a successful Dissertation.?

1.3 How do I choose a topic?

Some students choose a topic without fully realising the academic depth which is needed to succeed - there must be potential to go into depth. Some choose their topic on the basis of what interests them. This is fine - but beware of introducing your opinions which you may have held about the topic. Such opinions are of no value in a research Dissertation. In some ways it is safer to choose a field about which you have little knowledge - in that way you are almost bound to be objective. Also try to remember that the research focus may well change as you get into depth with a topic - that's not unusual and not negative if the research focus is in fact being refined.

As you explore topics , undertake preliminary reading (particularly of journals) to define your area of research, and discuss your plans with your tutor.

In discussion with your tutor, make sure you narrow down your topic area by analysing the available problem(s) which can be responded to. Reject subjects which might be interesting but where there is little likelihood of gaining the extensive and useful data which a Dissertation necessarily requires.

1.4 When should I start work?

First thoughts on your Dissertation must occur during your second year, or during your year out if you are a placement student. During this period you should be investigating general topic areas and undertaking preliminary reading - all to help you seek that *right* question / hypothesis which you would like answered - and which is realistic to answer in the time available. You would be well advised to discuss your ideas frequently with one of your tutors at this early stage. Do not fall into the trap of attempting primary research at this stage - you will need to devise your primary research strategy once you are well into the analysis of the information arising from your literature review.

2.0 Do I know what a research study involves?

2.1 Can I define research?

A definition of research given in the *Concise Oxford Dictionary* and is quoted by Naoum (1998) as “careful search or inquiry; endeavour to discover new or collate old facts” Key words useful in understanding research are synthesis, *data*, *analysis*, *critical evaluation*, *authoritative conclusions*, *intellectual rigour*.

2.2 Do I know what my research will involve?

Your Dissertation will comprise of several different but vital elements:

Defining the research study - where you will need to write down the definition of your hypothesis / question which you intend to investigate. This element should also involve defining a clear rationale for the research - why does it need doing? Arising from the hypothesis clear objectives for the research need to be identified. Objectives are the stepping stones to achieving an aim. They are measurable and will direct you through the necessary stages to responding to our hypothesis.

Secondary research

Secondary research is the process whereby the researcher collects data / information about the topic through largely previously published material. Initially this will comprise of an extensive literature review of articles, journal papers, conference papers, proceedings, internet papers, reports and books. Books are often the least useful as they are considered unreliable academically as evidence (because book contents are not subject to the same academic scrutiny as say journal papers). Books can of course be valuable if there is a historical context to your research.

The value of secondary research is that it identifies what original researchers / professionals have to say on a particular topic.

There are a number of stages to secondary research:

Identifying sources of data

Understanding & applying information retrieval methods

Collating knowledge / information - reading, note taking

Organising and sorting information

Appraising, critically evaluating the literature

Writing up the review

More detailed consideration of secondary research methods will follow

Primary Research / data collection

Once a thorough literature review has been undertaken you should be ready to design your primary research in detail. Primary research is the collation of data which will enable you to prove or disprove your hypothesis. Primary research must be carefully *designed* and *tested*, it can involve such activities as laboratory experiments, questionnaire surveys, case study analysis, and other field work research.

There are two key types of primary research - *quantitative* and *qualitative*.

Quantitative research is essentially “objective” in nature, and is based around the statistical analysis of numerical data which will help prove or disprove the hypothesis. Thus *quantitative* research might include the analysis of radon readings over time in a property before and after remedial actions have been undertaken, to prove (or not) whether a particular remedy is effective. Thus *quantitative* research involves the analysis of hard facts - it is not abstract. (Naoum (1998).

Qualitative research in the other hand is “subjective” and is often descriptive seeking to gain insights into peoples perceptions / opinions. Typical methods of gaining qualitative information

would be through interviews or by questionnaires. An example of a qualitative questionnaire question might be:

“Do you believe that surveyors are good team leaders in refurbishment projects? Yes, No, Don't know” Some qualitative research may involve open ended questioning - particularly where the research is exploratory (little is yet known on the subject).

A key component of your Dissertation will be the research methodology you adopt - you will need to decide precisely HOW you will collect your data and how much you will collect. You will need to consider the most appropriate method (surveys, interviews, experiments, etc.) and thereafter you must carefully design the method / experiment / survey AND TEST THAT DESIGN BEFORE COMMITTING YOURSELF.

Analysis and evaluation

There is little point in you collating really good data if you do nothing with it. The aim of the analysis is to obtain reasonably secure conclusions arising from the research, based upon a statistical analysis of the data collected.

It is **essential** that the data is fully analysed - to enable you to start drawing effective conclusions. Laboratory experimentation usually results in numerical data, but some qualitative research where open ended questions are used often produces descriptive data - which at first thought might seem difficult to analyse. The usual approach to this issue is to numerically code the answers - allowing a straightforward statistical analysis to result. Appendix B goes in to more detail on this.

So it is important to present your research information in a way it can be statistically analysed. What level of statistical analysis will You be expected to produce? This may vary, but minimum requirements you should consider are:

Frequency distribution analysis - tables, bar charts, pie charts- indicating how frequently observations / outcomes occurred as percentages, raw figures, etc.

Arithmetic mean - the numerical average of the results obtained

The median - the middle value of an array of numbers (it may differ from the true arithmetic mean)

The mode - The most commonly occurring value / observation

The Standard Deviation - is used as a measure of how the frequency of the results varies from the “normal distribution” Thus if there is a low standard deviation (say <8) the spread in the results would be considered to be unusually tight as compared to the norm (and an explanation therefore would be expected) Conversely if the standard deviation was high (say >15) the converse might be true.

There are also much more complex tests available to enable authoritative comparisons of data to be made - inferential method, parametric testing, chi-square testing. Full understanding of these more advanced statistical tools is needed before attempting to integrate them into your Dissertation results. What is important is that you *interrogate* your findings fully, making sure that you really do test out your hypothesis effectively. Test and question your results, query your statistical analysis to ensure that you extract all the benefit from your work. Reporting results simply is not sufficient!

Once you have completed the above, your aim will be to draw effective conclusions from your analysis and evaluation. That does not mean one short paragraph but pages of considered argument drawing together authoritative outcomes.

3.0 Do I know enough about research methods?

3.1 A reminder

Do you remember the stages of fulfilling a research project?

- *Defining the study*
- *Determining your research objectives*
- *Deciding on research methodology*
- *Collating data*
- *Evaluating data / testing your hypothesis*
- *Drawing conclusions*

In this section you will focus mainly on research methodology - as if you get that right, a good result should be assured. We will assume that you have successfully narrowed down your topic area, and agreed your hypothesis with your supervisor.

3.2 Secondary research

Remember that secondary research is the process of gathering together past research findings - what did others have to say about your topic? You already know that good secondary sources include publications like research journal / conference papers, BRE Reports, British Standards, government statistics, etc, and that text books are often not particularly useful. Remember that with secondary research material you are compiling other peoples interpretation of (usually their own) research findings.

Undertaking secondary research can be a daunting prospect, if only because of the number of sources you find you need to consult (over 50 would not be unusual). So it is very important that you approach secondary research methodically, and that you record your findings appropriately. You should make a record of your reading, both in terms of keeping a research diary (to keep track of your thoughts and activities) and in terms of research précis (usually kept in the form of a proforma..

You will be sourcing journal articles, CD ROM's, books, Reports, leaflets, abstracts, BSI publications, etc. For each you should devise your own record proforma, like the example shown in fig. 1 overleaf:

An important source of information about available sources are journal abstracts and indexes. You must expect to utilise this type of resource. If you have never used abstracts or indexes, see your librarian for an overview. As in using all information sources - record how you use abstracts / indexes by noting:

The title of the abstract

The format (CD ROM, Periodical, etc)

Date of abstract

Date of use

Method of search

Outcome of search (*print out / References selected / availability of references checked / interlibrary loan requested*)

One point to remember is that You will be using the Harvard system for citing references - so remember that you must record full bibliographic details for each source - including the publisher.

Journal Article		Ref: J/
Journal title	Vol	Date
Where located		
DEWI ref: Article title		
.....		
.....		
Pages		
Précis / key points <i>(either enter data here, or attach a separate sheet)</i>		
.....		
.....		
.....		
.....		
.....		
.....		
.....		
.....		
.....		
Further references		
.....		
.....		
.....		

FIG 1 A typical secondary research record

You can keep records on a data base, on paper (suitably filed and referenced), or on a card index system to suit yourself. Your records are for you - no one else, and are to help you succeed on your Dissertation!

Another tip on sources, use a bit of lateral thinking & initiative. For example have you ever sourced information from a main public library, which often have a huge range of reference texts and statistics. Similarly the RICS library in Great George Street in London is available and has a wealth of specialist and historic texts. So think and work CLEVER!

3.3 Primary research

Primary research is what sets apart the “men from the boys” (or girls from the women too), it the core of your study. In most cases you cannot conduct primary research until the secondary research is complete, or at least well under way - because you may not have the knowledge until then to know exactly how you will test your hypothesis.

There is a process involved in developing primary research. Your process should involve knowing what information you wish to collect, selecting the collection method, designing and testing the collection methods and then finally collecting the data.

Selection of collection method : You could collect your information by experimentation in the laboratory, by conducting surveys, or by observation. Choosing the appropriate method will depend upon your research objectives, but in many cases will be straight forward. For example if your

hypothesis involved the testing of the thermal performance of a particular type of wall construction, laboratory experimentation or field testing will no doubt be required. Whereas if you are conducting a study on the perception of Construction Managers on the effectiveness of undergraduate education in terms of team working - a survey of some sort will be needed. However, you should not jump to conclusions about the best collection method, you should interrogate your ideas to pick up the strengths and weaknesses of the relevant approaches - with a view to then minimising those weaknesses.

Experimentation research has a number of important elements, not least the need for two groups of experiment - the experimental group itself, and a control group - thus a comparison is needed otherwise your findings cannot be benchmarked. Experimental research must be highly structured - if it is loosely structured your results could be valueless (resulting in a failed dissertation?). Key words / phrases are - standardised approaches, quantitative data, deduction, rigidity of structure. At the time of writing the best expert in experimentation research within the Environmental Building Group is Steve Goodhew, although many of the Civil Engineering team are also highly experienced in this type of research.

Survey research involves the collation of information directly from people, generally using questions. Surveys are often used in the social science research for obvious reasons. You are likely to be familiar with surveys - as they are frequently reported and discussed in the press. Of key importance in this type of research is the design of the actual survey itself, and the actual collection method (telephone questionnaire, postal survey, structured interview, etc). Surveys must involve the selection of a sample of a population, usually random. Tiny samples of course may produce data of little value, and "selected" samples are likely to produce skewed (and therefore suspect) results. Many Dissertations do use surveys as the prime research collection method, but many students risk failure because their survey is weakly designed and poorly executed.. so you should make sure you consider your survey under the following headings:

- Size and type of sample
- Design of survey format
- Collection method(s)

Sampling

Samples must not be haphazardly selected. The size of the sample will depend on the reliability of the results which is needed, and of course the size of the full population, and there is no simple rule to guide you.. Common sense will tell you that serious analysis of a sample of say 10 questionnaire returns from an available population of 10 000 is very unlikely to be representative. (0.001% sample). Designing the research sample is important - it may be selected or random.

Selected sampling is usually adopted with the interview type of survey. It might be suitable for a highly specialised topic of research where the available sample is relatively small. You will need to compile a relatively long list potential names and addresses of company's / individuals likely to be able to provide relevant information. This can then be honed down to identifying particular individuals suitable for the study - identified perhaps through initial telephone calls. (If you interview the "wrong" person, you are wasting your time and theirs!). The final list will need to represent a group of people who share similar characteristics. The size of the selected sample may be smaller than a random sample - but remember that two or three interviews will not really be representative!

Random sampling is used when specific characteristics (like size of company, age of individual) for the sample are unimportant. There are two key elements to drawing up a random sample

- Defining the population (from which the sample is to be taken).
- Adopting a system of random selection

Defining the population takes some thought, but should be straightforward. For example, if your Dissertation is concerned with design practices of small Chartered Building Surveyor practices,

then once you have defined the term “small” you can prepare a list of all the relevant firms together with their addresses.

Random selection should be straight forward. For example for the case above you could write down a number for each of the small firms onto identical squares of card and then draw numbers from a hat (like a raffle). Or better still, get someone else to draw the numbers. What is important is that each firm has an equal chance of being picked. How do you decide how big your random sample is? That will depend upon the population size. However if there is a population of say 550 firms for a particular study, a sample size of around 100 may appear reasonable. Remember though that the return rate for your survey may be small. Decide upon how many *returns* you need and draw up your sample size from there. Return rates may be as high as 40-50% or as low as 10-20%. The return rate may vary with the quality of your questionnaire, the nature of the population, the data collection method (i.e. interviews can have a 100% return rate) and the quality of your overall approach. So, if you decide upon a postal survey, that you need at least 50 returns and you believe that you should get a reasonable return rate of around 30%, then aim to distribute 150 surveys.

Survey design

Early on you will need to decide whether you are going to carry out a postal survey, telephone interviews, or face to face interviews. There are factors about each which can guide you. For example will the identity of the respondents be known? If not, interviews of any type may be difficult. (Naoum 1998) provides an excellent table in his chapter on *Techniques for Data collection* providing a comparison of the attributes of postal and interview surveys. In short, it is worth remembering that postal surveys are impersonal and are particularly suitable for analytical surveys, they are quite cost effective and quick. However the questions need to be relatively simple.

Once the collection method has been determined, the survey form / questions must be carefully constructed. If this is not done well, the survey itself is futile. Perhaps the stages of survey construction are obvious. First define clearly the information sought (and endeavour to restrict the survey accordingly - it is tempting to add additional questions which are “interesting” but do not necessarily relate to the study). The objectives of the survey must be fully understood. Usually the objectives will include the following needs:

- To be unambiguous
- To be specific
- To be clear cut and concise

Before attempting to compile our survey - go back to your hypothesis, remind yourself of what you are trying to achieve. Then use a mind map, or a similar technique to frame out our “first thoughts” about your questions. None of these thoughts should include arbitrary questions - all the questions must be firmly founded on your earlier literature review and on your hypothesis. Sift through these questions and weed out any which appear to be inappropriately leading, or which appear to be too personal or sensitive. A leading question is one where there can only be one answer “how old are you?” Such a question may be valid for collating background material on the respondent, but will be inappropriate if it guides the respondent to what might be thought of as “the right answer” for example “*Do you care about the environment?*” Who would answer no?

Once the “first thought” questions have been prepared and reviewed, the final questionnaire can be constructed. This will involve introducing a number of sections or categories to properly frame and structure the survey. For example, in a survey on the health and safety actions of surveying practices you might include sections on:

- Background on firm
- Overall business activity
- Specific health and safety activities
- Training and CPD undertaken

The sequence of the sections must be logical.

As noted earlier, there are two types of question *Open* and *Leading*. Open questions offer unrestricted responses, for example:

What do you consider to be the most important environmental concern to your business?

Open questions will not be followed by any form of choice, but will be followed by space for the respondent to place their answer. Open questions can make objective quantitative comparisons (and thus statistical analysis) difficult if not impossible. But they are easy to ask, are useful if sensitive information is sought, and they empower respondents to respond broadly. Open questions are more suited to structured interviews than postal surveys, as the surveyor has more control and freedom to probe in the former.

Closed questions restrict the respondent to specific criteria / responses. For example:

Global warming is the single most important environmental issue facing humankind today, do you: Strongly agree / Agree / Feel neutral / disagree / strongly disagree

Closed questions may even have a YES / NO answer. The big advantage of the closed type of question is that an objective analysis can be quite easily procured using MS Excel or similar tools. However the questions asked must be the right ones!

Many surveys contain a mixture of Open and Closed questions, the proportion of each depending on the;

- nature of the research and its objectives
- the degree of information respondents have in relation to the question
- the speed and ease of survey completion needed (firms and individuals are busy - time may be at a premium).

The following guidelines may help you in constructing your final questionnaire;

- 1/. Keep the survey as short as possible long surveys may not be responded to, or may result in incomplete returns
- 2/. Keep the sequencing logical
- 3/. Use tick boxes or pre-coded answer categories as much as possible - make it easy for your targets to respond
- 4/. Give clear, but concise instructions
- 5/. Use appropriate language / terminology (avoid technical terms if you are surveying lay people)
- 6/. Where opinions are being sought, use tick boxes, checklists, frames, tables or rating scales to provide some objectivity. See the Global Warming example above, and read (Naoum 1998) Chapter 6.. A common approach is the semantic differential scale:

*Please indicate in priority order what you consider to be the most valuable aspects of your degree
(1 = no / minimal value, 4= Neutral, 7 = essential / Very high value)*

<i>Environmental theme</i>	1	2	3	4	5	6	7
<i>Development of technical knowledge</i>	1	2	3	4	5	6	7
<i>Undertaking live projects</i>	1	2	3	4	5	6	7
- 7/. Examine a range of other (successful) questionnaires first
- 8/. Obtain expert advice if needed - at least discuss the survey with your supervisor
- 9/. Experiment with different types of question

10/. TEST OUT YOUR SURVEY - DO A PILOT! THEN REVIEW AND IMPROVE YOUR SURVEY

Before committing yourself, remember the advice to be found in (Naoum 1998) - ask yourself;

- Is the research quantitative or qualitative?
- Is yours a comparative study or an investigation into a single issue?
- What is the depth required in the study?

Conducting the survey

Your survey must be properly delivered and executed if it to be successful.

You will need to compile a short, succinct covering letter, which must be professional and word perfect! The covering letter may be the mechanism to persuade the respondent to complete and return the survey, so explain your objectives, explain why it is important, and assure the respondent of the confidentiality of the survey (this is an important ethical issue which should not be taken lightly). You may choose to provide a return envelope (which if you can afford it should be stamped). *Anything you do to help the respondent will increase the likelihood of getting those invaluable returns!* It is best to give an end date for the survey - not too far ahead or people will put the papers aside (and probably lose them). A few weeks is best. In many cases the survey will be dealt with there and then particularly if it looks easy to respond to. One carrot may be to offer to send respondents a copy of the abstract of your Dissertation, or a synopsis. If you do this, make sure you honour your offer.

If you are carrying out structured interviews common courtesy dictates that you approach the entire exercise with professionalism. Agree the necessary appointments, confirm this in writing, if possible advise the interviewee of the questions / topics in advance, make sure you thoroughly prepare for the interview, dress appropriately. Fundamentally, record the results of each interview rigorously and faithfully. Each interviewee may need to be asked the same question if the study is comparative. Remember poorly recorded results may be all but useless. This is particularly true with telephone surveys too.

If the take up rate for your survey is poor you have a problem. Ask yourself why. Was the survey poorly designed? Was the sample appropriate? Was the timing wrong (i.e. over the Christmas break)? You may well need to revise and re-issue the survey! But first follow up the targets who have not responded and see if they can be persuaded to submit / complete the survey.

4.0 Do you know how to prepare your Dissertation submission - the report?

First, go back to section 1 - remind yourself about what a Dissertation is and is not!

Then read your brief carefully make sure you pick up all the points on House Style, referencing, etc. Can you expect to be penalised if you do anything contrary to the brief.

This guide will not cover in depth the submission preparation in depth, there are plenty of texts to guide you and if you provide your draft as required, your supervisor will provide you with invaluable feedback on the nature and style of your report.

Remember though the dangers of plagiarism, which for the purposes of your Dissertation include:
Uncredited quotations / copies from texts
Photocopies / scans of illustrations (unless written permission has been given by the copyright holder)

Your briefing paper provides basic information on the use of accepted referencing systems, and it is anticipated here that you will adopt the Harvard system. But you will need to explore the intricacies of this system in quoting non standard sources such as conference systems, internet sources, CD ROM's, etc. In each case full bibliographic details of the authors and the publishing source will be required.

Some basic do's and do not's:

Do write clearly

Do illustrate

Do adopt a formal style

Do avoid colloquial expressions, slang, or a style common to every day speech. You must not write as you talk!

Do keep sentences short if your grammar is weak. Do construct sentences carefully

Do provide a flowing logically progressing text

Do consider developing conclusions to each chapter to lead into the next

Do expect to do four or five drafts at least

Do spell check CAREFULLY

Do keep to the word / page count to avoid penalties

5.0 AND FINALLY

REMEMBER THIS MAY BE THE MOST IMPORTANT PIECE OF ACADEMIC WORK YOU EVER DO. OWN IT AND TAKE PRIDE IN IT.

YOUR DISSERTATION MAY BE ON YOUR BOOKSHELF FOR THE REST OF YOUR LIFE!