Course: CSYM023

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This module takes the form of a series of eight learning packages. The aim of the module is to provide you with the basic research skills that you require in order to successfully complete your research. You are also encouraged to read more extensively on research methods, and the books given in the reading list provide a more detailed discussion on research methods. Some of these books are available from the university libraries or purchased via the Internet, e.g. from Amazon.co.uk.

“Research is defined as seeking through methodical processes to add to one’s own body of knowledge and, hopefully, to that of others, by the discovery of nontrivial facts and insights” [Sharp and Howard, 1996, p.7].

Module Contents

Module Guide

Lesson Contents

Introduction

Draft Scheme of Work

Assessment & Deliverable

The Process

M-level Dissertation

General
### Course: CSYM023

**7**

**Topic:** Introduction

**SCHOOL:** Science and Technology

**FIELD:** Computer Systems

**MODULE TITLE:** Computing Dissertation

**Module Code:** CSYM023  Dr Scott Turner

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**IMPORTANT:**

After the proposal has been submitted you are expected to work on the dissertation as if the proposal had been accepted. DO NOT wait until you get the proposal back before starting work on the dissertation.

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### Draft Scheme of Work

This scheme is work is indicative only. The taught session are designed to be flexible depending on need so there may be some movement of the sessions.

This scheme is indicative only. The taught session are designed to be flexible depending on need.

<table>
<thead>
<tr>
<th>Week</th>
<th>Morning</th>
<th>Afternoon</th>
</tr>
</thead>
</table>
| 1    |  TENANT; Introduction and data governance and TENANT: 
|      | TENANT: Class-based Activity: Final Project | Paper-based Activity: Final Project |
|      | TENANT: Class-based Activity: Final Project | Paper-based Activity: Final Project |
|      | TENANT: Class-based Activity: Final Project | Paper-based Activity: Final Project |
| 2    |  TENANT: Class-based Activity: Final Project | Paper-based Activity: Final Project |
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|      | TENANT: Class-based Activity: Final Project | Paper-based Activity: Final Project |
| 3    |  TENANT: Class-based Activity: Final Project | Paper-based Activity: Final Project |
|      | TENANT: Class-based Activity: Final Project | Paper-based Activity: Final Project |
|      | TENANT: Class-based Activity: Final Project | Paper-based Activity: Final Project |
| 4    |  TENANT: Class-based Activity: Final Project | Paper-based Activity: Final Project |
|      | TENANT: Class-based Activity: Final Project | Paper-based Activity: Final Project |
|      | TENANT: Class-based Activity: Final Project | Paper-based Activity: Final Project |

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**Module Code:** CSYM023

**SCHOOL:** Science and Technology

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**Topic:** Introduction
Course: CSYM023

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- Literature Search for final project
- Refine proposal
- Consider the data needs of the dissertation
- Consider the social, ethical issues

5

- Dissertations structure and own voice

Class activity

- Independently undertaken work

Hand in your proposal

Prepare your presentation

5
The module begins with a series of tutorials which help you to understand the difference between a Masters level and undergraduate level dissertation.

- As early as possible you must select a topic. Each computing tutor will outline suitable topics; you may choose one of those. Alternatively, you may choose your own topic. In either case, you must also approach a tutor requesting them to be your dissertation supervisor.
- You should discuss your chosen topic with your supervisor in order to ascertain exactly the nature of your dissertation. You should both sign a "Dissertation subject/supervisor form" and hand it in to the Module Leader.
- After a few weeks you must hand in a written proposal for your dissertation. Details of how to write your proposal will be given in the early lectures/tutorials.
- Your proposal should include a week by week plan for your dissertation; for example, in the form of a Gantt chart (there's an example on Nile).
- You should approach the librarian for help regarding the literature review aspect of your proposal and later on the dissertation. You should request an Athens username/password for accessing bibliographies and Journal papers if working outside the university campus. (One of the session you will have is with the librarian)
- You are also required to make an informal presentation of your proposal.
- Your proposal will be marked by the module leader and moderated.
- You will need to discuss with your dissertation supervisor how to contact them over the summer break.
- It is vital that you progress with the work week by week. It is your responsibility to manage your work including any meetings with your supervisor. You should keep a log of your progress and meetings.
- You may opt to present your work in September or in the following January. Should you wish to submit your work in January you must notify the Course Leader in writing before the end of August.
- At the end of the Module you must submit for marking the following items:
  (a) two paper copies of your dissertation,
  (b) one electronic copy of your dissertation,
  (c) one electronic copy of any software developed as part of your dissertation. The paper copies should be bound as described in the early tutorial and notes.
- Finally you must attend a "viva voce" examination. This will last around 45 minutes and usually consists of three parts: where you explain your work, demonstrate anything you have developed e.g. software, and answer a few questions on your work. The audience will consist of your supervisor, a second designated marker, and any other tutors interested in your work.
- The dissertation is independently marked by your supervisor and the second designated marker. They then meet to agree a grade.

For M-level Dissertation:

- Your dissertation topic should be chosen very carefully. It should be relevant to the subjects you have studied or pertinent to the wider topic of Internet computing. It must have an element of research.
- Your dissertation may involve you: (a) attempting to prove some hypothesis or (b) attempting to solve a problem. It may not be merely a study of what others have done. It needs to have an element of your new work.
- Because of the nature of your Masters degree, you will usually develop some end products (e.g. software) as integral parts of your dissertation. You need to:
The role of your supervisor

Your supervisor's responsibility is to:

- advise you on the topic of your dissertation and on available resources,
- advise you on risk assessment if appropriate,
- discuss with you the progress of your work,
- offer guidance on the structure and presentation of your dissertation,
- offer you feedback on various sections of your dissertation,
- advise you on research methodology,
- advise you on the design, implementation, testing and evaluation of any "end product",
- advise you on referencing and plagiarism,
- ensure that any external communication you wish to make concerning your dissertation is appropriate and carried out professionally,
- assist you in identifying problems,
- maintain regular supervisory contact with you,
- advise you on ethical practice within your work where appropriate.

Your supervisor will not:

- micro-manage your work;
- feedback on a full draft of your dissertation before you submit it;
- contact you if you fail to attend supervisory sessions;
- provide advice on information sources.

Your responsibility as a dissertation student is to:

- agree a schedule of meetings, ensuring that the agreed schedule is adhered to and that deadlines are met;
- use this supervisory time allocated effectively;
- keep any appointments made;
- maintain a record of the supervisory meetings;
- manage the interaction with your supervisor;
- agree to act responsibly and professionally.

Supportive comments do not necessarily indicate high performance nor is constructive criticism necessarily indicative of low performance.
Introduction

The purpose of this learning package is to:
- provide guidance on the initial planning of your research project
- provide guidance on the formulation of a research question
- provide guidance on the selection of a research question and a working title

This package is concerned with initial planning of a research project. The package is concerned with initial planning of a research project.

Lesson Contents

- You and your supervisor
- Supervisors' role
- External activities
- Research proposal
- Focusing on area of research
- Research plan
- Selecting an area of research
- Students' responsibilities
- Introduction
Selecting an area of research

You may not have a choice in the particular area to research, the money for your research is for a particular area. Within this there is often some flexibility on how and what you actually look at within the area of research. The other form is your own idea. This is often a difficult part of your research and has to begin with a carefully considered initial idea. For either route, you should choose to do something you are actually interested in, this work is going to take up a lot of your time. The idea then needs to be turned into your research question, i.e. what is it you want to find the answer to? Further questions then follow naturally from this such as:

- Can the question be answered in the period of time available?
- How and where can I obtain the information I need?
- What method should I use to gather the data?

The topic you select to research should have some originality. This does not mean it needs to be entirely original, for example. Originality can result from using already known material but with a new interpretation, or from taking a topic from the course and carrying out an extended study. The level of originality though depends on the level of the study, a PhD has to have more originality than an MSc.

If you are still unsure of the research topic, follow the steps given below:

- Initially consider a number of topics.
- Decide on the topic you wish to research. This should ideally be an area that interests you, sponsored students may have a topic imposed on them by their employer.
- Do some initial reading sufficient to give an indication that there is enough available information to allow you to continue.
- Decide on the initial research question.
- Talk to your supervisor.
- Think about your question and then give it precise focus. Carry out further reading if required.
- Arrive at a working title.

Let us assume you are interested in finding out if using the internet leads to more efficient industries. The initial research question may then be: Does using the internet lead to more efficient industries? From which a working title can be formed, such as:

"Improvements in industry by the use of the internet"

At first sight this appears to be an interesting area of study, but now consider the title against the following questions:

1. What industry are we to consider? Does this apply to all industries?
2. How is the data on efficiency to be obtained? From published data? By surveying companies?
3. How long will it take to gather the data and complete the research?

Other questions can also be posed, but consideration of those above is adequate to show that the selected topic is a very broad area of research that will require a considerable amount of time and effort to complete. We can conclude therefore that it is in its present form not a suitable MSc research topic. Some focus could be given by considering only one industry and the effects on using the internet. Even then, it may be difficult to determine any conclusive link between the introduction of the internet and efficiencies that have occurred. Further focusing may be required in order to be reasonably sure that the dissertation can be successfully completed to the required standard and in the time available.

It is apparent that focusing makes you consider not only the research question, but also the method(s) you will use in gathering the required data and organizing the dissertation.
The next logical step is to draw up your initial plan for the research. It should include:

- A working title based on the research question.
- A brief discussion of the main problem you wish to solve. This will include the aim and objectives of the study and address the secondary questions that follow from the selected research question.
- A brief description of the methods, or methods, you intend using to gather the data you require to answer the research question.
- An action plan in the form of a Gantt chart.
- Your thoughts on the main problems that you anticipate encountering during your research and how these might be overcome.
- Initial references.

Using the procedures in this package select an initial research question and then give it focus to arrive at the final question and hence a working title. If you have already decided on a research question then check it for focus and decide on a working title. Having decided on a research question and working title do you think that you could complete the dissertation in the period June to September?
Topics: Students' Responsibilities

Taken from the University's Dissertation Policy

To:
• agree a schedule of meetings,
• ensuring that the agreed schedule is adhered to and deadlines met,
• use supervisory time allocated effectively, manage tutorial time effectively by preparing for the tutorial in advance,
• keep appointments which have been arranged,
• maintain a record of supervisory meetings,
• agree to act responsibly and professionally when on fieldwork,
• understand the regulations with regard to plagiarism,
• take advantage of University support mechanisms (see appendix A.4),
• make use of NUPAD guidance and documentation to plan and monitor progress of the dissertation,
• to maximise the benefit of tutorial support, and to implement agreed action for development,
• recognise their ethical responsibilities.

(UoN 2007 pp. 4)

Topics: Supervisors' role

Taken from the University's Dissertation Policy

To advise on:
- the topic of the dissertation and on resources
- risk assessment, where appropriate
- methodologies
- assumptions, where applicable
- the design, methodology, and procedures of the research
- the structure and presentation of the dissertation
- the use of NUPAD guidance and documentation (see appendix B)
- the exercise of supervision and other developments
- maintaining a record of supervision of the dissertation
- keeping a record of any external work on the dissertation
- keep up-to-date with literature and other developments
- develop an understanding of the literature and other developments
- keep up-to-date with literature and other developments
- keep up-to-date with literature and other developments
- keep up-to-date with literature and other developments
- keep up-to-date with literature and other developments
- keep up-to-date with literature and other developments
- keep up-to-date with literature and other developments

(UoN, 2007 pp. 5)
Case Study - Semantic Web

Task 1: What is the Semantic Web?
Task 2: Create a plan for a project that uses the semantic web.

Questions:

1. Have you met your potential supervisors?
   - Yes
   - No

2. Have you completed the literature review for the case study?
   - Yes
   - No

For each question, indicate the correct answer by placing a mark in the column to the left.
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Answer 1
Have you met your potential supervisors?
Select the correct answer.

- Yes
- No

Correct Answer Feedback:
Good.

Answer 2
Have you completed the literature review for the case study?
Select the correct answer.

- Yes
- No

Correct Answer Feedback:
Good, but keep at it.

Answer 3
Have you completed the literature review for the case study?
Select the correct answer.

- Yes
- No

Correct Answer Feedback:
What did you learn about this? What tools did you use?
Your dissertation and proposal both must have an aim and set of objectives.

### Element

<table>
<thead>
<tr>
<th>Detail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aim A single general statement outlining the dissertation.</td>
</tr>
</tbody>
</table>

#### SMART

<table>
<thead>
<tr>
<th>Element</th>
<th>Property</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Specific</strong></td>
<td>Need to be precise about what you are going to do.</td>
</tr>
<tr>
<td><strong>Measurable</strong></td>
<td>How are you going to measure the objective?</td>
</tr>
<tr>
<td><strong>Achievable</strong></td>
<td>Can it be done?</td>
</tr>
<tr>
<td><strong>Realistic</strong></td>
<td>Can it be done in the time you have and the resources available?</td>
</tr>
<tr>
<td><strong>Timely</strong></td>
<td>When will the objective be completed? Is the deadline stated?</td>
</tr>
</tbody>
</table>

All objectives must be SMART.

---

**Questions to ask yourself**

- Who are you going to involve?
- What strategies will be used?
- Is the objective well understood?
- Is there a clear outcome?
- Will this objective lead to results wanted?

---

**Questions to ask yourself**

- How are you going to measure the objective?
- Does the measurement have relevance to the outcome?
- Can we get it done in the time available?
- What are the limits?
- Can we do this with the resources available?
- Is this possible?
- Are the resources available?
- Can we do it with the time available?
- Will the deadline be met?
- When is the deadline?
- What are the resources needed?
- Will this be achievable by X?

---

**Questions to ask yourself**

- What exactly are we going to do?
- Who are we going to involve?
- What strategies will be used?
- Is the objective well understood?
- Is there a clear outcome?
- Will this objective lead to results wanted?
The project is to deliver to at least six sessions (specific) to 120 students (this with the six sessions is measurable). You make the judgement about how realistic and achievable it is. It also has a specified time limit (timely). Can you refine this?

Topic: Self Test

Now please do the following (i) Set a single aim for your research. (ii) Set three objectives for your research (iii) When parts (i) and (ii) are swapped with another member of the group for their comment. (iv) Things to consider as the reviewer: Are the objectives SMART. Does the aim give a general overview of the research to be done? How will the objectives be achieved? Can you see how the success of the objectives will be measured? From this aim and objectives can you see: (a) What are the objectives? (b) How will you achieve them? (c) What evidence will you need to support these objectives? (d) When will you achieve these objectives? (e) Where will you achieve these objectives? (f) How will you measure your success? (g) What will you use to record the progress and achievement of these objectives? (h) Who will be responsible for monitoring these objectives? (v) When task (iv) is completed give your feedback and suggestions to the person who set the aim and objective for their consideration. (vi) Make any changes to your objectives and aim you feel are appropriate and swap them with a different person in the group and repeat.
Lesson Contents

Planning and Sources

Planning tools

Topic

Use of the Internet

Use of Library

Sources 1

Electronic journals

Planning tools

Introduction
Topic: Introduction

Here is a summary of things that you should consider when carrying out a literature search.

1. Select a topic:
   This is a relatively obvious starting point. You may, however, have several options in mind for a research topic, and select the most appropriate one dependent on preliminary reading.

2. Define the terminology:
   Think clearly about what you mean to achieve from your research topic. Set yourself targets, and think about the context in which your research is set.

3. Define parameters:
   Set yourself parameters in the area of your research. E.g. what is the time period of the study (1990 to the present day) or what sector (internet applications in the leisure industry).

4. List possibly related sources:
   Think about possible alternatives to finding information on your chosen topic. For example, you may find information on lift fire damage under building fire damage, or fire brigade reports etc.

5. Select sources:
   Use a subject-based approach with the terms selected above. Make a note of library classifications and indexes, as you may well find relevant information in this subject area. One source of reference will invariably result in a ‘cascade’ to produce further useful sources.

---

**Planning tools**

We are going to look at some software tools that can be used to help structure and plan your work.

- **Mind map software**: allow you to organize thoughts, brainstorming ideas or list making into a desirable mind map diagram. As Mind mapping diagrams are useful because they represent words, ideas, tasks, or other items linked to and arranged around a central key word or idea. Plus more, Mind maps are used to generate, visualize, structure, and classify ideas, and as an aid in study.

   Examples can be found at:
   - [http://bubbl.us](http://bubbl.us)
   - [https://bubbl.us/beta/](https://bubbl.us/beta/)
You can use activity diagrams/networks to help when activities need to be done. A useful free download is QSEE lite (http://www.leedsmet.ac.uk/qsee/complete.htm) which was several different tools.

A simple visual tool for project scheduling, breaking the work down into tasks. It illustrates the start and finish dates of the tasks. A downloadable free piece of software can be found at: http://www.ganttproject.biz/ This software was used to produce the chart above. Spreadsheet packages can be used to do this as well.
Some of the pitfalls of just going to the library and see what happens are highlighted on the website (http://www.allenandunwin.com/estudy/research.asp#research) though it was written for undergraduate students, some of the pitfalls and advice is the same. The main bits of advice being: - If in doubt ask the library staff for help; - Get to know the layout of the library, for example where the books and journals likely to use and where the photocopiers are. Carrying large numbers of books from two floors up several times can get a bit tiring; - Set the goal of why you are going into the library. Know why you are going into the library on this day. It is easy to get distracted, if you find something that might be interesting later in the research, make a note of it for another time. - Set realistic time limits for how longer you are going to stay in there. - Accept your probably never going to 100%, no question, full knowledge of everything that has been published. This can lead to 'Well, I not sure I have enough to start.' Start the literature review, and change if necessary, later.

Having selected a topic, defined the terminology and parameters, and selected appropriate search terms, you are in a position to begin looking for materials. Here is a brief summary of possible sources of information:

1. Books
   A useful tool is the British National Bibliography (BNB) or National equivalent for those outside the U.K., which should be available in most public libraries. It lists all books available, as well as some government publications. The index may give you some idea of other related terms you have not thought of. Most libraries also have a computerized catalogue that you can use when searching.

2. Journals and Articles
   Should be your main source of information. For more specific and recent material, you should consult appropriate journals. The library may have some electronic means of searching for a particular journal or article, or you may have to consult the index. Most journals publish a complete index for the year. An ever-increasing amount of journals are available on the Internet.

3. Databases
   Many specific databases relating to journals and abstracts can be found on the Internet. Some of these are free and others you must pay to gain access. Many are subscribed to by UoN learning resources, e.g. the 'Web of Science' and you should contact the Faculty of Applied Sciences librarian, or the help desk for more information of what is available and how to gain access. They will also be able to assist you with finding information for your research topic, and with the loan of books and journals from other libraries (inter-library loans). Go to their web site at http://www.northampton.ac.uk/lrs/index.html for more details.

4. Theses and Dissertations
   Theses are a useful tool to see what work has been done, or is currently being done in your subject. An index and abstract is generally available in academic libraries (either electronic or printed). Some theses are available for inter-library loan, and some may not be released. This depends on the confidentiality of information contained in the thesis.

The above list of reference sources is far from exhaustive, and you may well find other useful information in places such as manufacturers' catalogues, internal company data sheets, externally produced reports and papers etc. The key really is to try and locate as much relevant material as you can within the time allowed, but not to be too ambitious. You will always want to obtain more information, but must resist the temptation at the expense of depriving other areas of your dissertation work.
Use of the Internet

Like the libraries because of the vast amount of information that is available on-line the use of the internet has its positive and negative aspects. For an internet computing it had see how you got here without using search engines, so we will not discuss how to use them. The problem with these is the amount of information produced and the reliability of the information. Anyone can produce a webpage and the information is not always reviewed by anybody (more so than journals and books) so is not necessarily correct. The sheer amount of information can be a problem. As an experiment, try this URL for internet computing research:

http://www.google.co.uk/search?hl=en&q=internet+computing+research&meta

At the time of writing this had about 15,500,000 results, so many to work through. So suggestions of how to use them:
- Aim to be specific, you behave as if respectable.
- Aim to modify your search engines sources.
- http://www.google.co.uk/search?hl=en&q=internet+computing+research&meta

Sometimes these need a specific username to get access, so you would need to talk to the library.

Electronic journals

A lot of electronic journals are now available. Libraries often have electronic sources:

http://library.northampton.ac.uk/databases/index.php?view=az

Sometimes these need a specific username to get access, so you would need to talk to the library. Some of these journals are now available on-line and finding them is not always easy. If the journal is not free, the charges may vary from library to library. If the library you are using does not have electronic journals and you are not prepared to pay then you may need to use the library search engines. So we will not discuss how to use electronic journals.
Any piece of research involving the use of data or evidence will require an understanding about where people have already written about a topic. This information will be used to support or refute your own findings and thoughts on the subject. Whilst, for small-scale research, you will not be required to produce a definitive account of all of the material and research for your chosen topic, you will need to demonstrate that you have a grasp of the current state of knowledge. Ideally, the majority of your reading and literature searching should be in the early stages of your period of research. In practice, however, a number of activities are usually ‘on the go’ at any one time, and your literature searching and reviewing may spill over into other areas of your research proposal outline. You need to take care that reading does not take up more time than you have allowed. It is rarely possible to obtain all the sources of material you require, at the time when you want them, so you will inevitably have to re-organise your plans when you are waiting.
Topic: What to do?

Reading as much material as time allows about your research topic may give you plenty of ideas on how best to approach your research. It may also give you ideas about how you could classify and present the information you gather. You may even decide to gather some data of your own for analysis. It is not sufficient for your research to merely present and describe information and facts that you find. You must organise information into a coherent pattern, and provide a rational discussion of your own thoughts given your findings.

Exercise 1

Ok, let's work through some material on referencing.

Why we reference?

How do we use references within the text?

How to construct a reference?

How to use references in the text?

We are going to look:

Ok, let's work through some material on referencing.

This will give you some ideas on how to organise your own research and the essential skills for:

You will also begin to see relationships to other issues.

You may begin to get a feel for the need of evidence and how other people have presented on

This may suggest your direction.

You must gather information and a conceptual framework, and provide a rational discussion of your own

It is not sufficient your research is merely presented and describes information and facts that you find.

Finding as much material as time allows about your research topic may give you plenty of ideas on

You may even decide to gather some data of your own for analysis. It may also give you ideas about how you could classify and present the information you gather.
What is this Literature Review?

For the dissertation, you are required to undertake a literature review. The purpose of this review is for you to investigate what information already exists on your particular chosen topic. It should be more than merely a 'list' or 'account' of the sources of information that you have consulted. It should demonstrate that you have studied existing works in your field of interest, and have appraised them with some critical insight.

Writing a good literature review can be a demanding process! It should provide the reader, albeit in a succinct form, with the context in which the research is being undertaken – why are you doing this and what has already been done. It should do so by giving the reader a sense of what you think and how it relates to your work.

There are many good sources of information and advice on reviewing and discussing the 'literature review' process. Take a look at some of the recommended books on the book list for this module, and you will be able to find some excellent guidance into critically reviewing literature, and the discussion of the 'literature review' process invariably occurs in all books on research methods and techniques.

Finding information

We will come back to this topic later in the module. Just to start with, here are some key points.

In order to proceed with your literature review, it follows that you must begin by locating information regarding your chosen subject. If you are given a topic to investigate, then you may also be given a preliminary list of reference sources. If you have chosen your own topic, you will need to find out for yourself what has been published in your field, even if time only permits you to read a selection of books and articles. Whatever your topic, it is important that you consider the following key points:

1. Try to find the most relevant published materials as quickly as you can. Remember, the bulk of your reading should come at the beginning of your dissertation studies.
2. Avoid getting too bogged down. The literature review only forms a part of your dissertation. It will not be possible in the time period for you to read everything written on your chosen topic. Try to be selective.
3. Get into the habit of recording and categorising information found during your reading, so that it may be more easily used at a later date. (We will discuss this later.)
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**Topic:** What needs to be recorded

Whichever referencing system you choose (more on this later), you will always need to record the following details of sources:

- **Books**
  - Author's surname, forename or initials
  - Date of publication
  - Title (underlined)
  - Place of publication
  - Name of publisher
  - Your Comments and Notes

- **Journals**
  - Author(s)
  - Title of journal
  - Volume number
  - Date of issue
  - Page numbers
  - Publisher
  - ISSN Number
  - Your Comments

- **Articles in collections (i.e. in a book)**
  - Author/editor
  - Date
  - Title of book
  - Place of publication
  - Name of publisher
  - Page numbers
  - Your Comments

**Bibliographic Software**

There are software alternatives (and some feel more appropriate) to the card index that does the same thing. The first and simplest is to set up your own database or spreadsheet to store them. Alternatively there are specialist software that do this but will also link the reference into a Word document. EndNote is a widely used commercial package. There are alternative opensource (i.e. free) package such as Bibus available. Have a look at the following URL it contains a comparison of various types:

You may wish to use direct quotations in your dissertation in order to illustrate a point, or to add an extra dimension to an argument. It is important that you make an accurate and full copy of any potential quotation you wish to use, including full details of the source from which it came. Quoted material should be presented as in the 'referencing guide' included, and any words that have been left out must be made clear to the reader. The source of the quote must be suitably acknowledged.

### Exercise

With your dissertation idea in mind, now have a go at the following tasks:

<table>
<thead>
<tr>
<th>Task</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Find three references that relate to your dissertation idea.</td>
</tr>
<tr>
<td>2</td>
<td>Using the references found during task 1, write a 250-500 word summary (not including the reference list) as well as the end.</td>
</tr>
<tr>
<td>3</td>
<td>Add the reference list (using Harvard Referencing) as well as the end.</td>
</tr>
</tbody>
</table>

Sharing your summary on your University web area.
An essential part of the research process is keeping accurate records and notes of your findings. Keeping accurate records is a vital part of the research process. It helps you keep track of the valuable information – at which time, it could be thrown away or forgotten. Keeping records and notes of your findings is a necessary part of the research process. It helps you keep track of the valuable information – at which time, it could be thrown away or forgotten.

### Introduction

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### Keeping Records

#### Lesson Contents

- **Introduction**
- **Making Notes**
- **Keeping Notes**
- **Log book**
- **Record Activity**

1. **Topic:** Keeping Records

   An essential part of the research process is keeping accurate records and notes of your findings. Keeping accurate records is a vital part of the research process. It helps you keep track of the valuable information – at which time, it could be thrown away or forgotten. Keeping records and notes of your findings is a necessary part of the research process. It helps you keep track of the valuable information – at which time, it could be thrown away or forgotten.

   **Record Activity**

   | Log book |
   | Keeping notes |
   | Making notes |
   | Introduction |

---

An essential part of the research process is keeping accurate records and notes of your findings. Keeping accurate records is a vital part of the research process. It helps you keep track of the valuable information – at which time, it could be thrown away or forgotten. Keeping records and notes of your findings is a necessary part of the research process. It helps you keep track of the valuable information – at which time, it could be thrown away or forgotten.
Making Notes

The amount of note making you do and the form it takes will depend on your research topic. An analytical topic may require that you record vast amounts of data using a computer, whereas a literature-based topic may require no 'data' but reference to many books and journals. Whatever your topic, you should aim to keep your notes as brief as possible without losing the detail of what you are trying to record. Ending up with vast reams of notes may prove of little value when you come to organise them for your write-up. If you have a relatively clear idea of your research topic before starting, then you may be able to take fewer notes. If you judge that you may need a particular source at a later date, but not at present, then you need only record a bare outline of its details.

Keeping Notes

The first decision that you must make is whether to keep notes in hard-copy or electronic format. There are a few basic advantages and disadvantages, which you must carefully assess. However, a good format is in a loose-leaf file. In this way, you can begin to organise information into sections, and form cross-references between related items. Whatever approach you adopt, it is a good idea to develop your own system and to remain consistent. Here are a few ideas for good practice:

- Use headings to group facts and ideas in a meaningful way.
- Use a numbering or indexing system.
- Use underlining or highlighters to emphasise key points.
- Use abbreviations (but remember what they mean).
- Use spacers and dividers to categorise information.
- Always record the source of information.

You may also wish to keep and index photocopies or electronic copies of information (pages from books, journals etc). Remember to observe any copyright legislation, and to keep an accurate note of the information source.
Keeping a log book is good practice. In the logbook you should record all activities relating to your research project – and the dates on which these were carried out e.g. dates of visits and interviews, basic findings of reading, questions and ideas, random thoughts if you wish etc. Such a document provides a useful chronological record of the progress of your research. This can enable both you and your research supervisor to monitor your research progress, and also forms part of the assessment process. Mostly it is for you to keep track of your project though.

The format of the logbook may be:
- A loose-leaf folder;
- A notebook;
- A page-per-day diary;
- A box-file with everything in it;
- Some people do it all electronically.

The important point is you must record what you do. You can bet that the piece of information you did not record is the one you need.

<table>
<thead>
<tr>
<th>Activity</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>For each using the Harvard Referencing system. Write a reference for each of these. After each of these write a short summary of each one (each should be no more than 250 words)</td>
</tr>
<tr>
<td>2</td>
<td>Taking of these write a note on how some part of this could be implemented.</td>
</tr>
</tbody>
</table>

You did not record is the one you need.
This learning package aims to make you aware of the various research methods available to researchers and hence to enable you to select methods appropriate to your area of research.

Finding any textbooks that deal specifically with research methods in technology-based subjects is difficult. However, this is of no great concern since the methodology of research is well established and documented in other disciplines such as the social sciences and education. Although a great deal of information about these disciplines is available in this learning package, this is of no great concern as the methodology of research is well established and documented in other disciplines such as the social sciences and education. Any textbooks that deal specifically with research methods in technology-based subjects will be of great use to you and to your area of research.
Quantitative vs Qualitative Research

These are the two broad research categories with which you should become familiar. As indicated above, there is much philosophical debate regarding the exact nature of qualitative and quantitative research. Whilst beyond the scope in great detail here, it is a debate which you should explore out of personal interest. Quantitative research is objective and concerned with gathering factual data, usually in numeric form, and its analysis. Qualitative research, on the other hand, is subjective in nature and concerned with gathering data in the form of opinions, perceptions and experiences. The data is generally non-numeric. The distinctions can be illustrated by considering the performance of a website.

- Data could be collected over a period of time and analysed in terms of number of people visiting the website. As long as the performance is determined in a factual manner the research is clearly quantitative. This should be clearly stated in the aims and objectives should be clearly stated at the outset.

- However, if you form opinions on the performance based on what people think then this is subjective analysis, which is associated with qualitative research.

- An alternative method would be to survey the visitors over the same period of time seeking their opinions on the performance of the site. The data and its analysis are subjective, even if you attach numbers to the data for the purpose of grouping and categorising passenger responses. This is clearly qualitative research.

Ok, now it gets complicated. In computing research you often have to do a bit of both. You might have to usability of a product (subjective therefore, qualitative) but in the same dissertation you might have to analyse of sales (quantitative).

Methods and Methodology

The examples above indicate some methods that can be used to gather data in technology-based areas. To solve the problem a method or methods of gathering data is required. For the purpose of this course the term methodology may be taken to mean the system of methods used. You should however be aware that methodology does have a broader philosophical meaning.

The research methods appropriate to computing or computer engineering and their main characteristics are outlined below.

- Quantitative Research is objective and concerned with gathering factual data usually in numeric form. It involves collection of numerical data which can be used to gather facts in numbers-based research.

- Qualitative Research involves collection of non-numerical data which can be used to gather new insights or perspectives in non-numeric-based research.
Experiments are tests or investigations designed to provide evidence for or against a hypothesis. They may be carried out in a laboratory or as fieldwork. With laboratory experiments, the hypothesis is often expressed as an objective, and the report includes method, results, analysis, and conclusions. The experiment may be concerned with establishing how one physical quantity (y) varies as another physical quantity (x) is independently varied. Hence, y is referred to as a dependent variable and x as an independent variable. The basic experiments to determine how current changes with changes in resistance illustrate these points. If the voltage applied to a variable resistor is maintained constant, then current (I) can only change if the value of resistance (R) is changed, and so I is a dependent variable and R an independent variable. This basic example also reveals something further regarding the experimental conditions, because resistance is also dependent on temperature, and so the temperature must be accounted for during the experiment. It follows that for experimental design great care is needed in identifying all the conditions imposed on the system and controlling/measuring them so as to eliminate erroneous or misleading results.

In the social sciences, experiments are usually concerned with a comparison between two groups of people where independent variables are manipulated. Again, care is required in establishing and controlling the experimental conditions, particularly with regard to the selection of sample groups.

Surveys are concerned with the collection of information. The information may be obtained in a number of ways:
- From a group of people.
- From observation of events, e.g., from observing the number of persons using a website in a given period of time, what features they use and don't use.
- From literature or documents.

The first two types involve some fieldwork whereas the third type is essentially deskwork. Surveys have the specific advantages that they can be carried out relatively quickly and at relatively low cost. Furthermore, the data obtained can be easily expressed in numeric form and hence can be statistically analyzed.
Action Research is applied research and is well suited to those who wish to carry out research at their place of work. It is problem-focused research in a particular context that aims to bring about improvements in working practice. The key point about action research is that the person doing the research is not an outside expert conducting experiments on subjects, but is a co-worker doing research with and for the people considered. The researcher is part of the research. It is an iterative process the results from each cycle feed into the next cycle. As an example, if you were looking at how web design is implemented, you might start by thinking about problems raised. The next cycles would involve implementing designs, seeing how well they worked, and then thinking about problems raised. The next cycles would involve implementing designs, seeing how well they worked, and then thinking about problems raised. The next cycles would involve implementing designs, seeing how well they worked, and then thinking about problems raised. The next cycles would involve implementing designs, seeing how well they worked, and then thinking about problems raised. The next cycles would involve implementing designs, seeing how well they worked, and then thinking about problems raised.
Have you met potential supervisors? Select the correct answer.

Yes
No

---

**Selection Exercise**

Now it is time to practice making informed choices. If you have a dissertation idea, use this. If you don't need to produce a dissertation idea, use this.

You can change your mind later. Please discuss and share ideas among your group.

### Activity

<table>
<thead>
<tr>
<th>Task</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name four approaches and list the advantages and disadvantages of each for the dissertation idea. Theme your approach with the dissertation idea in mind. Produce a table stating the approach to be used.</td>
<td>2</td>
</tr>
<tr>
<td>Name your approach with the dissertation idea in mind. Produce a table stating the approach to be used.</td>
<td>1</td>
</tr>
</tbody>
</table>

### Table

<table>
<thead>
<tr>
<th>Approach</th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Approach 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Approach 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Approach 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Approach 4</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Based on the table produce above, make a justified argument for the approach to be used.

Correct answer: Yes.
Whatever topic you choose for your research, this will inevitably involve the collection and analysis of data of some kind or another. In this learning package, we shall consider a variety of different sources of data, and some key points to their collection. We shall not, at this stage, look at how to analyse, interpret or present data. This will be covered in the next learning package.
Choosing methods

The method or methods by which you select to perform your research will largely determine the method by which data collection and analysis will be undertaken. The essence of effective research is asking the right questions. The questions that you intend to answer through your research will influence your selection of methodology, and hence your methods of data collection and analysis. Here is a brief recap of some of your ‘questioning’ and ‘research’ approaches you may decide to take.

<table>
<thead>
<tr>
<th>Method</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Descriptive or Theory Testing</td>
<td>This is often the first stage in the research process, and is sometimes called ‘exploratory research’. The questions asked here are generally broad or vague – such as “What is going on with the lifts in this building?” An entire project might be based on descriptive or exploratory research, and end with a plan for further research.</td>
</tr>
<tr>
<td>Pure and Applied Research</td>
<td>Some kind of research projects will involve finding things out (pure research) Others will involve the application of what is found out, or the making of recommendations for action (applied research). Look at your project and decide which category it falls into.</td>
</tr>
<tr>
<td>Testing a Hypothesis</td>
<td>For some research, rather than asking questions, we may wish to make statements that can be tested. These statements are commonly referred to as ‘hypotheses’. This type of research process is referred to as ‘hypothesis testing’, and researchers often set about proving or disproving a hypothesis by testing it. E.g. If the accident rate on lifts has fallen then this must be due to improved safety standards.</td>
</tr>
</tbody>
</table>

Before we proceed to a discussion of some actual techniques for collection of data, you should recap on the broad research methodologies which they fall under. You will be able to find a more detailed explanation of each of these in Learning Package LP2, and in the research books on the recommended reading list for this module.

Methods of collecting data

The methods by which you decide to gather data for your research project and dissertation may be many and varied, but will generally fall into one or more of the following categories:

- Documentary evidence or data
- Experimental data
- Questionnaires
- Interviews
- Observation

Let us look briefly at each of these categories. You will be able to find much greater detail of these in the research books on the recommended reading list, which you should study.
For your research project you will be expected to show some analysis of documentary evidence. This may be the core of your research, or may be used to supplement information that you gain from other sources. It is a particularly useful technique where access to the subject of your research is difficult. But what is meant by documentary evidence? In addition to locating and analysing the usual books and journal articles etc., other sources such as films, videos and electronic sources such as the Internet can be classified as 'documentary evidence'.

Documents can be divided into two main groups – primary and secondary.

<table>
<thead>
<tr>
<th>Groups</th>
<th>Description</th>
<th>Detail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary</td>
<td>These are sources which come 'first hand', such as the minutes of a meeting, a letter from a customer, an interview transcript.</td>
<td>These are sources of information that are based on the analysis of primary sources. For example, if you have conducted an interview, you may need to review your notes and any supporting documentation.</td>
</tr>
<tr>
<td>Secondary</td>
<td>These are accounts or interpretations of primary sources. For example, an analysis of the minutes of a meeting, or an analysis of questionnaire data.</td>
<td>These are sources of information that are based on the analysis of secondary sources. For example, if you have used a reference to a book, you may need to review the source of that book.</td>
</tr>
</tbody>
</table>

Documentary evidence may also contain numbers as well as words, and so its analysis may be qualitative or quantitative. Whatever the sources of information used, you must remember that it is important to obtain a good representation of information from as many writers on the subject as you can. Analysis and presentation of information from documentary sources must also be done critically. You must also acknowledge all sources of material used in your research.

You may decide that you wish to carry out some experimental work, and the gathering and analysing of the data which you obtain. You may also find that the raw data that you require is already available, and only requires analysis. Remember that any experimental work must be backed-up by suitable and sufficient reading and research of the research topic.

One technique of experimental research is to take an active set and a control set and to form a comparison between these. Another is to simply gather raw data from an experiment or exercise. Whatever techniques you choose for gathering and analysing data, remember not to get too bogged-down. The amount of data you obtain, and the complexity of its analysis must be chosen to suit both the requirements and time constraints of your research project.
Questionnaires are another way in which you may decide to gather data and information. You will first need to decide the purpose of the questionnaire, the kind of questions you wish to ask, and how you intend to analyse the results. A great deal of care must be taken with their design and administration, and you will be able to find suitable guidance in most research methods books. A range of different techniques exists for the type and style of questions that you can set. Be careful with wording, and don’t make the questionnaire unnecessarily long or complicated. You should also be aware of ethical issues when designing questionnaires, and the nature of your intended audience.

The questionnaire should always be piloted before final issue. The data which you gather may be analysed using both quantitative and qualitative techniques, depending on the types of question you set. We shall take a more detailed look at analysis and presentation of results in a later learning package. In general, the response (return rate) to questionnaires may be somewhat poor and disappointing, and you must plan a contingency into your research project should this occur. An alternative to actually setting and administering questionnaires is to analyse data already obtained by someone else through a questionnaire. Vast amounts of data sets are now freely available, or available at a suitable cost from various research council data archives and other sources. You will, of course, not be able to set your own questions – but have to use the ones already set. This is worth investigation!

Interviews are another means by which you may decide to gain information. Again, you need to decide what information you wish to find out, what questions to ask, and how you will analyse and present findings and results. There are a few key guidelines which you should follow when carrying-out interviews, all of which are discussed in detail in research methods books.

Interviews may be structured, where you prepare and ask a set of questions (rather like a questionnaire), or unstructured where the interviewee may speak more openly. You should decide which approach to take, in light of how you will later analyse your findings. It is always a good idea to pilot your interview questions before going live. Make sure that you clear all the necessary channels, book an appointment for the interview, arrive on time, and keep within a specified time limit. The interview may be recorded by taking appropriate notes (structured in the form of a grid, or unstructured), or by using a tape recorder, with appropriate permission of the interviewee. You should, if appropriate, check the accuracy of the facts that you have recorded with the interviewee before publication, and also respect their right for anonymity if requested.

Remember that interviews are time consuming. They have to be setup and then undertaken and the results have to be carefully recorded and analysed. Gaining access, and arranging a mutually agreeable time with a busy interviewee may prove to be a problem. If the interview was taped, then you may require this transcribing for analysis, adding more time and expense. They may, however, provide a clearer response than a questionnaire, as a particular issue can be clarified and developed as required. See Next Learning Package for further detail.
Another way in which information may be gathered is by observing and recording what is actually going on. This technique will most likely not be applicable to your research project, and is quite difficult to undertake. Planning is again the key. Decide what information you wish to find out, how you propose to undertake this, and if this is really the most appropriate method.

A suitable method has to be devised (possibly the use of a grid or the like) for recording the activity being observed e.g. the actions of passengers when waiting for lift service at a landing, or discussions at a project team meeting. A pilot study and any revision is always a good idea before the actual event. After the data has been collected, it has to be collated and analysed. There are again ethical issues to consider when observing and reporting people's behaviour. The presence of an observer may influence the actions of those being observed in some way, and so the results may not be entirely natural.
Interviews vary in style based on how structured the interview is. Taking the definitions from Robson C (2002):

- **Fully Structured Interviews**: Questions worked out beforehand very fixed in a very fixed order in the main.
- **Semi-Structured Interviews**: Questions are worked out beforehand but the order of the them, or whether to include particular questions is altered by the interviewer based on what happens with a particular interviewee. The actual wording is sometimes changed depending on what happens with a particular interviewee.
- **Unstructured Interviews**: The interview has a general area but lets the conversation develop. It can be formal or informally done.

**When is it appropriate?**

- If a study focuses on finding what a particular item means to a particular person, group or organization.
- When new system has been introduced and you want to find out how it is working and what you want to measure effectively.
- When you need to find out how things have been done before finding out how particular changes affect.
- A study focuses on finding what a particular item means to a particular person, group or organization.
- When new system has been introduced and you want to find out how it is working and what you want to measure effectively.
- When you need to find out how things have been done before finding out how particular changes affect.
- A study focuses on finding what a particular item means to a particular person, group or organization.
Question Types

<table>
<thead>
<tr>
<th>Question Type</th>
<th>Detail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Closed</td>
<td>Closed questions force an interviewee to choose from a list of fixed alternatives.</td>
</tr>
<tr>
<td>Open</td>
<td>Open questions are those provide very loose restrictions on the content of the reply. The only real restriction is the reply has be about the subject the interview focuses on. These are common used in interviews. These have the advantage of being flexible; can lead more depth understandings; can encourage better co-operation; get unexpected answers. Some people argue you can get a more 'accurate' response. The disadvantages are mainly they can more difficult to analyse or the interviewer loses control.</td>
</tr>
<tr>
<td>Scale</td>
<td>Scale questions are those that measure degrees of agreements. The design can vary from a simple yes-no question to a complex five-point scale. There is a belief that people prefer to select the middle value if given a choice. Some researchers use a four scale to force people to agree or disagree.</td>
</tr>
</tbody>
</table>

For each question, indicate the correct answer by placing a mark in the column to the left.

Question 1
What type of questions are multiple choice questions in general?
- Closed
- Open
- Scale

Question 2
What type of Questions is "Describe what you think of the internet?"
- Closed
- Open
- Scale

Question 3
What type of question is the following: "What did you think of the session circle the appropraite number Poor 1 2 3 4 Excellent"
- Closed
- Open
- Scale

Course: CSYM023
Topic: Question Types
<table>
<thead>
<tr>
<th>Answer 1</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>What type of questions are multiple choice questions in general?</strong></td>
</tr>
<tr>
<td>Select the correct answer.</td>
</tr>
<tr>
<td>Closed</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Answer 2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>What type of questions is “Describe what you think of the internet?”</strong></td>
</tr>
<tr>
<td>Select the correct answer.</td>
</tr>
<tr>
<td>Closed</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Answer 3</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>What type of question is the following: “What did you think of the session circle the appropriate number Poor 1, 2, 3, 4, 5 Excellent”</strong></td>
</tr>
<tr>
<td>Select the correct answer.</td>
</tr>
<tr>
<td>Correct Answer Feedback: Correct</td>
</tr>
</tbody>
</table>

Note: Answers appear on the next page.
## Interviews

Interviews can be open-ended and in-depth. In this type of interview there is a lot of flexibility. The type of interview that you choose will depend on the answers that you need to get from your interview. Depending on the answers you get from your interview you will be able to ask more questions that will help you to understand the answers that you have already received.

### Types of Interviews

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Structured</td>
<td>These are similar to questionnaires and surveys. They are used to gather data that is easy to analyze.</td>
</tr>
<tr>
<td>Semi-structured</td>
<td>This type has a certain amount of flexibility. The interviewee is used to answer open-ended questions.</td>
</tr>
<tr>
<td>Unstructured</td>
<td>These can be open-ended and in-depth. In this type of interview there is a lot of flexibility. The type of interview that you choose will depend on the answers that you need to get from your interview. Depending on the answers you get from your interview you will be able to ask more questions that will help you to understand the answers that you have already received.</td>
</tr>
</tbody>
</table>

**Structured**: These are similar to questionnaires and surveys. They are used to gather data that is easy to analyze. The interviewer has control due to the inflexibility of the type.

**Semi-structured**: This type has a certain amount of flexibility. The interviewer still has their question list and the topics that need to be covered. The flexibility is the interview has flexibility to alter the order of the questions and wording used. It is a bit like an actor improvising they may a list but it is up to them how it is used and all that matters is getting the information. It is usual though to have some structured elements. A lot of interviews will use structured questioning when they are after some types of information and more open questions for other types. As an example a market researcher might has basic set of structured questions, depending on the answer go to more open questions to pull out.

**Unstructured**: These can be open-ended and in-depth. In this type of interview there is a lot of flexibility. The role of the interviewer is quite different they have to guide the interviewee. Telephone interviews can often be of these types.
Focus Groups

Here is the confusing bit, they do not have to be in a group, they can be one-to-one (but one-to-one of several individuals in a group). In terms of structure these can be any of the above. Focus groups are meant to get a group to ‘focus’ on specific topics. Usually these are open-ended discussions and usually not quick to collect the responses. The interviewer role is to guide the discussion. These are efficient methods as the amount of data collected from several people simultaneously increases the quantity of the data. Group dynamics can help to focus the topic, and enable shared views to be seen. Not an expensive method and participants can be stimulated by the comments of others. There are disadvantages though. Number of questions has to be very limited and to be effective the interviewer needs to be skilled. Bias is a potential problem, as those with strong personalities can dominate. Confidentiality is limited by the group nature.

Self Test 1

Now you have worked through the material now consider question types, interview and focus groups. (You don't have to use the space provided below to answer the following questions)

1. For each of these think of an example of how they could be used successfully in your dissertation work.

2. Now consider the three you are most likely to use and state advantages and disadvantages.
Introduction

The following dictionary definitions provide a useful starting point when considering the meaning of ethics:

1. (usu. treated as sing.) The science of morals in human conduct; moral philosophy. 2 a (treated as pl.) moral principles; rules of conduct b (often treated as pl.) a set of these (medical ethics)

[The concise Oxford Dictionary]

From these definitions it is clear that ethics is about moral values and codes of behaviour. All professional bodies have their own code of professional conduct, which determines the expected moral values and codes of behaviour within the profession. The engineering institutions, in addition to their code of professional conduct, also issue a series of guidelines to provide information on the professional code of conduct. These codes of conduct are developed in response to ethical issues and are designed to guide the professional code of conduct. The engineering institutions also provide a series of guidelines to help professionals develop their own code of professional conduct. These guidelines are designed to help professionals understand the ethical implications of their actions. If you are a member of a professional body, obtain a copy of their code of professional conduct.
### Research Ethics

Whether you carry out qualitative research or quantitative research you will be concerned with gathering data, which will then be analysed and presented in the final report.

#### Issue

<table>
<thead>
<tr>
<th>Description</th>
<th>Help to avoid problems/ issues to consider.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plagiarism</td>
<td>The direct copying of work by others and presenting it as your own whether intentionally or not, and the need to acknowledge and correctly reference all direct quotations used in your reports. Correct referencing (using the Harvard system). The University has an NILE module called UNPAC aimed to help. From the Library Liberation (<a href="http://library.northampton.ac.uk/liberation/">http://library.northampton.ac.uk/liberation/</a>).</td>
</tr>
<tr>
<td>Confidentiality</td>
<td>If you intend to gather data from companies or from individuals you must seek their permission and explain the purpose for which it is to be used. Any agreement reached on the use of the materials must be observed and the provider of the data may require evidence of this. If you use data that is already published make sure that it is correctly identified and referenced in your report. There is a further problem here with the sponsors of the project being the organisation you are using as a case study. What do you do if your research results raise points that would potentially be detrimental to the organisation. They are sponsoring you, but your results that have to be seen by people outside the organisation. There is a conflict of interest. What do you do?</td>
</tr>
<tr>
<td>Anonymity</td>
<td>This follows from confidentiality, e.g. if a company or individual supplying data wishes to remain anonymous. How do you present the data so that they cannot be identified?</td>
</tr>
<tr>
<td>Informed Consent</td>
<td>In research that involves others participating in your research. The participants must be fully informed about the purpose of the research before they agree to take part. Defining what informed consent means is difficult, but from a practical point of view we have to design the consent to include any information the participant is likely to need to decide whether to take part or not. It is usual to include a 'cooling-off' period between agreeing to take part and actually taking part. Some studies have a cooling-off period of 24 hours, the length of period depends on the nature of research. It is possible that providing some information could bias the research in certain directions. The informed consent stage is also where the question of conflict of interest can also be addressed by saying what is going to happen with the results.</td>
</tr>
<tr>
<td>Professionalism</td>
<td>The means working according to laid down code of professional conduct and presenting your report in a manner that adheres to the generally acceptable code of research behaviour. You must also be aware of the ethical issues during the planning stages of your research.</td>
</tr>
</tbody>
</table>

At all stages ethical issues may arise and so your research should follow a generally acceptable code of research behaviour.
Most institutions (including University of Northampton) have established ethical policies on how research is conducted and what needs to be considered for research to be ethical. This includes any type of research carried out. Part of this is a formal committee to monitor ethical issues in research activity. Though their role is in part to disseminate good practice and establish ethical policy, a lot of their work is reviewing research proposals to ensure ethical issues are considered and addressed.

As example, if your research was concerned with finding how school children use web-pages to aid learning. This research has several ethical issues such as:

- How can a child give informed consent?
- Can a specific child be identified from the data?
- Can a child be harmed by the research?
- Does the researcher need to have a CRB check?

Generally, if you have any doubts that there are ethical problems that you want advice, you should ask advice from the ethics committee. Ethical committees usually have the power to veto a research proposal, but usually they make recommendations to improve the research design. If you are involved in research with the National Health Service involving patients, it might have to be referred to the local NHS ethics panel for approval as well.
Introduction

Data collection, by whatever methods you choose, means very little until it is analysed, evaluated and presented in a suitable format. Gathering vast amounts of information in the hope that some useful information will emerge is certainly not recommended for the type and timescale of study which you are undertaking. This will also make the analysis more complex and time consuming. You must, therefore, decide what the restrictions are for your research topic, and gather both the quality and quantity of information and data that can be readily analysed, interpreted and presented.

In most 'short timescale' projects it will be sufficient to only analyse data in a relatively simple way. If your methods of data collection are well devised and you have adopted a system, then the task of analysis and interpretation will be all the more simpler.

One important point to note is that of generalisation. With a relatively small-scale project, care must be taken not to claim more than the information you have gathered warrants. Equal care must also be taken not to attempt generalisations based on an insufficient amount of data e.g. based on the results of 10 interviews, it is claimed that lift maintenance is unnecessary.

Interpreting and Presenting

The methods by which you choose to analyse, interpret and present the information that you gather during your research will largely depend on the topic you have chosen, and the methods you select for collection. The key, as always, is not to be too ambitious. This also relates to the amount (and possibly quality) of information you gather. Too little information will not be sufficient to support your argument, and you are in danger of generalising based on 'insufficient information'. Too much information, and the task of analysis will become too much, or too complex to achieve. It is important to remember that simply evaluating and presenting the information (e.g. collating responses to a questionnaire, and presenting as graphs) is not sufficient – there must also be some (critical) interpretation of your findings.

You will be able to find ample reference and examples of different techniques for analysing and presenting information in the research methods books on the reading list for this module. Depending on your research topic and chosen framework (e.g. literature searches, experimental research, questionnaires, interviews etc), some of these references will be more appropriate than others. Try to, at least, have some idea of how you are going to analyse and present (not forgetting interpret) your information before you start collecting it. Your ideas may well change, but at least this will give you some guidance as to what you should be collecting.
Presenting Methods

- **Lists**: Lists are a simple way of collating and presenting information. They may also be used for simple analysis (e.g., most important first in list, then descending order). Numbers may be placed against each item in the list, and a graph produced if appropriate.

- **Categorisation**: Another way of grouping and analysing data is to put it into categories (e.g., age ranges or number of a particular type of lift breakdown etc.). Results may be presented in a table, or as a graph.

- **Grids/Tables**: Grids and Tables may be used to show 'one-dimensional' data or perform some simple correlation between data (e.g., types of lift breakdown against lift usage). Again, results may be presented in tabular or graphical form.

- **Scales**: Scales are generally used to give some discrete measure of a particular item (e.g., in a questionnaire—rate lift performance from 1 (good) to 6 (poor)). There are many different types of scale that can be used, so consult the research methods books. Findings can again be presented in tabular or graphical form.

- **Graphs**: Graphs are a good way of analysing and presenting data. Be careful, however, not to include them just for the sake of it, and make sure that they are clear.
The analysis and presentation of data lends itself to the use of a computer and software packages. You should be able to carry out all of the analysis and presentation of your data using a spreadsheet, such as Excel. With all spreadsheet software, you can tabulate data and very easily produce graphs for inclusion into your dissertation. It is possible with most packages to perform quite a complex level of analysis. Special statistical software packages (such as SPSS) are available. For mathematical analysis of experiments, you may also choose packages such as MATLAB or MathCAD. Remember, however, that the time available for your whole research project is limited, and that getting to grips with a new and unfamiliar piece of software is often time-consuming.

**Dissertation Structure**

**Lesson Contents**

- Structure of Classic Dissertation
- Environmental Type Dissertation
- Style and voice
- Appendices
Course: CSYM023

Introduction

This is the final learning package and deals with the structure, format, presentation and writing of the dissertation. You will recall that at the weekend schools and throughout the course we have encouraged you to adopt a particular style of writing and presenting your assignment work. This package reinforces those procedures already covered in detail and offers further ideas for drafting and writing the dissertation.

To comply with university regulations, the dissertation will be approximately 12,000 words.

As discussed before, there is a classical dissertation structure, and we have encouraged you to follow

- Title page
- List of contents
- Abstract
- Introduction (approx. 10%)
- Literature review (approx. 25%)
- Methodology (approx. 15%)
- Presentation and analysis of data (approx. 25%)
- Comments and critique of outcomes or findings (approx. 20%)
- Conclusions (10%)
- References

To comply with university regulations, the dissertation will be approximately 12,000 words. The word count includes all words in the dissertation. The structure shown is not set in stone so that variations are acceptable. However, the elements contained in the classical structure must be present. The word count includes all words in the dissertation. The structure shown is not set in stone so that

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Introduction

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To be considered
The dissertation must be word-processed and all pages, diagrams, tables and figures prepared using suitable software and appropriately numbered. Take care to set the page layout, margins, font, etc on your computer before you start processing. Select a font that is easy to read, those with serifs are generally easier to read than those without - Times New Roman, as used in this document, has serifs whereas the Helvetica font does not. The following are requirements:

- 25 mm margins
- double spaced lines
- single sided printing
- 12 point font size

Remember that consistency of layout and format is paramount. If abbreviations and acronyms are to be extensively used throughout the report then the first time the name is introduced it must be abbreviated and thereafter the abbreviation used, e.g University of Northampton (UoN) when introduced and UCN thereafter. If there are numerous abbreviations and acronyms then a list should be included after the contents page(s).

Element | Detail
--- | ---
Title | The layout of the title page is as follows:
| Quality Assurance in Internet Engineering by M. Mouse BSc
| Submission date: 15 August 2010
| A dissertation submitted in partial fulfilment of the requirements of the degree of Master of Science in Computing at University of Northampton

Abstract
"The function of the abstract or executive summary is to summarize briefly the nature of your research project, its context, how it was carried out, and what its major findings are."
(Blaxter, L. et al 1996, p238)
UoN requires the length of the abstract to be approximately 200 words. Abstracts have the following uses:

- provide potential readers with a quick overview of the dissertation
- help the writer to focus and structure or restructure the report
In the latter case it may be useful to start draft the abstract before the dissertation is completed.

Drafting
Drafting and writing begins as soon as you start to collect data. It follows therefore that there will be a number drafts and revisions before you arrive at the final document. Although approaches to writing depend very much on the individuals concerned, it is a good idea to write up as you gather information. Editing will then take place as more information is gathered and to take account of the word limit and to link the sections of the dissertation together. The following points should also be considered.

- If you encounter difficulty in starting to write then try writing the introduction to the dissertation. Although you will have to redraft this a number of times it should help you to focus your thoughts with regard to the collecting of data and other relevant information.
- Writing blocks may occur at any time. If this happens process any information you have gathered just to try and remove the block, the way forward may then emerge during this activity.
- Sometimes when writing the ideas just flow. Unfortunately the problem you may then encounter is that of lack of time to complete the section you are writing. When this happens leave clear pointers to the next topic you wish to introduce, perhaps by writing the start of the next sentence or by a series of bullet points so it is relatively easy to recommence writing.

Non-discriminatory language
You must use non-discriminatory language throughout your dissertation. The basic principle involved is writing in such a way that it does not denigrate or exclude particular groups of people on the basis of what may be fairly arbitrary characteristics, such as sex, age, race, religion, physical and mental abilities or sexual orientation. (Blaxter et al 1996, p. 224)

Heading and sub-headings
The classical dissertation style suggests a limited number of main headings. Care is needed with sub-headings and the numbering of headings and sub-headings should be avoided. You are writing an academic dissertation where clause and sub-clauses are important for reference purposes. If you use sub-headings it must make the text more accessible, not turn it into a directory of short paragraphs with no coherent flow of ideas. If your essay is coherent, with one part relating to another, building to a conclusion, then you will not need many sub-headings. (Barnes 1995, p. 84)

Referencing and Quoting
References appear in the text as a signal that evidence in the form of books or papers exists and can be found elsewhere if the reader wishes to pursue this avenue. Quotations are verbatim, that is, given in the exact words of the writer and included in the text so that the readers do not have to hunt for them. (Barnes 1995, p. 74) The Referencing Guide to the Harvard System of referencing is available on the University's website (http://library.northampton.ac.uk/files/guides/harvard.doc) and should be rigorously adhered to.
Experimental-Type Dissertation

There can be modification to this classic dissertation structure. An example of which is shown here for experimental dissertations. An example structure is shown below.

· Title page
· List of contents
· Abstract
· Introduction
· Literature review
· Experiment
· Methodology
· Presentation and analysis of data
· Comments and critique of outcomes or findings, ideally that lead to the next set of experiments
· Conclusions
· References

The Experiment section may be repeated several times.

To comply with university regulations the dissertation will be approximately 12,000 words.

The word count includes all words in the dissertation. The structure shown is not set in stone so that variations are acceptable. However, the elements contained in the classical structure must be present.

You must discuss the structure of dissertation with your supervisor.

Style and voice

As we have already indicated you should not wait until you have gathered all the information and data to start. This should be a piece of professional quality work. Does it have to be in the first person? What about your future employer? Does it have to be in the present and passive voice? Once you decide to write the dissertation must be done efficiently and effectively.

You must ensure that you can write a clear, concise and comprehensive dissertation. Your dissertation must include evidence to support your arguments. Your dissertation must be clear and concise.

The experiment section is classic experimental science. An example of which is shown here.

You must discuss the structure of your dissertation with your supervisor.
Appendices are used for material that is not vital enough to be included in the main part of the dissertation. So let us look at some example cases.

<table>
<thead>
<tr>
<th>Element</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code</td>
<td>You would include the code you produced in an appendix (as well as any CD/DVD) and use extracts in the main dissertation. Talk to your supervisor if you are unsure.</td>
</tr>
<tr>
<td>Extra Theory</td>
<td>If you have some theory or background information that you would like to include, you might consider this as an appendix. Talk to your supervisor if you are unsure.</td>
</tr>
<tr>
<td>Extra Materials and Procedures</td>
<td>Talk to your supervisor if you are unsure.</td>
</tr>
<tr>
<td>Appendices</td>
<td>In the rare case where it is vital but not possible to include in the main body, you should list these in the appendices.</td>
</tr>
<tr>
<td>Appendices of Results</td>
<td>You should list results in the main part of the dissertation.</td>
</tr>
<tr>
<td>A further use is you can create and appendices contain all of a sample</td>
<td></td>
</tr>
</tbody>
</table>