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BSc and Diploma in Computing and related subjects

Project

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This subject guide is for the use of University of London International Programmes students registered for programmes in the field of Computing. The programmes currently available in these subject areas are:

BSc (Honours) in Computing and Information Systems
BSc (Honours) in Creative Computing
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Notes

1. Introduction

CO3320 Project is unlike any other course on your degree. It involves putting what you have learnt in other courses into practice, in a significant endeavour requiring sustained effort, independent thinking and project management skills. It is natural to feel a little apprehensive about the Project at first; most students will have never attempted anything quite like this before. However, year after year, many students find it the most engaging and rewarding part of their degree.

The successful completion of the Project will equip you with many invaluable skills for your future career, whether you plan to work commercially or to pursue academic research. Each year, we see Projects that have clear potential for commercialisation, and others good enough to be published in the academic literature.

The Project is an opportunity for you to identify a topic that interests you, to develop a deep understanding of the topic, and to create something new in that area. It may sound obvious, but it really is the case that the more you put into it, the more you will get out of it.

Because this is the first time that most students will have undertaken something of this nature, we do see various kinds of problems crop up year after year. Problems can occur in every aspect of the Project, from choosing a topic, planning the work, implementing software, testing, analysing data, writing the final report and managing to complete everything on time. This Project guide is designed to help you avoid these common problems, so that you can successfully complete a well designed, well executed, and well written piece of work. Do read through this guide and the prescribed textbook (Dawson, 2009, see p.2) before you start, and also look at some of the additional resources highlighted throughout the guide (these are summarised in Appendix A).

Having read this guide, you will have a good idea of how to go about things, and of what the Examiners will be looking for. With a good grip on that, you can then concentrate on the interesting (and fun!) part of deciding what subject you wish to explore, and identifying specific aims and objectives. Once your Project is properly defined and structured, you should find this course every bit as engaging and rewarding as others have done in previous years.

Learning aims

The Project will enable you to:

- shape the emphasis of your degree study to your interests and needs for the future, through Project topic selection
- develop your ability to work independently on a substantial scale (of an order of magnitude greater than a coursework assignment, and so qualitatively greater in size and complexity)
- demonstrate your originality, creativity and perseverance
- develop an understanding of professional and academic documentation issues; in terms of communication skills, coherence, structure and fitness for purpose
- graduate with a coherent, focused body of written work suitable to show prospective employers or graduate admissions tutors as evidence of ability and achievement in large scale, independent work.

Learning outcomes

On the successful completion of the Project, and through the use of the relevant reading, you should be able to demonstrate:

- the ability to investigate diverse and extensive information sources, to analyse them, and to select from them relevant materials for a specified purpose, with a justification of decisions and choices made
- the ability to make your own decisions (such as design choices) based on analysis of extensive evidence and to give a rational justification based on reasoned argument
- enhanced abilities in analysis, design, implementation, testing, documentation in proportion according to the nature of the Project
- the ability to combine skills and knowledge related to design, human communication, human–computer interaction and information technology
- improved awareness of both technical and non-technical issues, in relation to the Project
- improved time management and ability to work to deadlines, especially with evolving project requirements
- improved skills in the management of unstructured, or complex, project work.

Reading

Essential reading

Dawson, C.W. *Projects in Computing and Information Systems: A Student's Guide*. (Harlow: Addison Wesley, 2009) second edition [ISBN 9780273721314].

Supplementary reading

Cornford, T. and S. Smithson *Project Research in Information Systems: A Student's Guide*. (Basingstoke: Palgrave Macmillan, 2005) second edition [ISBN 9781403934710].

Raimond, P. *Management Projects: Design, Research and Presentation*. (London: Chapman and Hall, 1993) [ISBN 9780412468100].

Rogerson, S. *Project Skills Handbook*. (Bromley: Chartwell-Bratt, 1989) [ISBN 9780862381462].

There are several books on Projects that can be recommended. The most important is Dawson (2009), which is Essential reading, and which you should purchase. Other suggestions are Cornford and Smithson (2005), Raimond (1993), and Rogerson (1989), as listed above under Supplementary reading. Some of these concentrate on projects of different types, so choose ones that are closest to your interests. You will find that these books help clarify the kind of work your Project involves, as well as the methods and reasons for doing it. These books, and others, are included in the References section at the end of this guide, which you should refer to before reading the rest of the guide.

Please note that throughout the guide, there are references to particular sections in these texts, which are Essential or recommended reading. You should make sure that you read or refer to the reading sections listed in the guide, which may or may not be listed as specific Reading activities.

Note that different authors may advise slightly different approaches to some items, such as report content lists or layout. Any directives in this guide take precedence over advice read elsewhere. However, you are free to utilise recommended practice in other texts that you find useful and that is not in conflict with any directives in this guide.

Assessment

Important: the information and advice given here are based on the examination structure used at the time this guide was written. Please note that subject guides may be used for several years. Because of this we strongly advise you to always check both the current *Programme Regulations* for relevant information about the examination, and the virtual learning environment (VLE) where you should be advised of any forthcoming changes. You should also carefully check the rubric/instructions on the paper you actually sit and follow those instructions.

You will be assessed on your Preliminary Project Report (PPR), Final Project Report and examination. These will demonstrate the quality of your Project in terms of:

- **Content**, consisting of three coherently related parts:
 - **Challenge** (for example, the question to answer, problem to solve or thesis to argue)
 - **Context** (including the background to your work, usually expressed as a literature survey that justifies the methods you use by analysis and comparison of the work of others)
 - **Contribution** (what you did to meet the challenge within your context).

Remember, it is important to check the VLE for:

- up-to-date information on examination and assessment arrangements for this course
- where available, past examination papers and *Examiners' reports* for the course which give advice on how each question might best be answered.

Recommendation on study time

The workload is expected to be the equivalent of **at least 300 hours intense, focused effort**.

1.1. Preface

It is important to make your degree relevant for your future, be it in further academic study or in work. To help in this you have some choice in what you study via the Level 3 options and your Project.

The Project is most important in this regard as it allows you to develop prior learning on the programme to address an interest that relates to your plans for the future. Following a relevant interest will help maximise your motivation and make the Project the most inspiring and enjoyable part of your degree.

While the majority of students attend an institution where supervision of the Project is provided, and this is most helpful, students can, and do, successfully complete the Project alone. If you are studying without a supervisor then be sure to read the advice given in Section 7.1 of this

guide and in Chapter 7 of Dawson (2009), and interpret any suggestions in relation to a supervisor in terms of self-reflection in the learning process.

Because the Project forms such an important part of the degree while allowing a wide range of topics, it has given rise to more queries from students than any other course. These queries arise from uncertainties about both the nature of the work involved as well as the nature of the report that has to be produced. This edition of the Project guide does six things:

1. It answers questions raised by students.
2. It describes, in a chronological fashion, the work required when undertaking a Project.
3. It gives advice on the Project examination, as well as Sample examination questions and comments on how to approach answering them.
4. It provides updated information on the criteria and processes used by the Examiners when marking the Final Project Report (see Section 12).
5. It describes revised requirements and procedures for submitting the Preliminary and Final Project Reports. **In particular, note the new format requirements for the PPR (Section 6.1), the new submission arrangements for the PPR (Section 8.2.1), and the fact that an electronic version of the Final Project Report must now accompany the submitted hard-copy version (Section 8.2.2). The Project Description Form, used in previous years, is no longer required.**
6. It lists various supplementary resources, where you can find additional help and advice.

The Project is unlike other courses. The independence of the work and its requirement for originality will be challenging to all students. Meeting this challenge effectively is what makes the Project so worthwhile.

This guide should be studied carefully. Directions on process are included to help you with approach and structure. There is rarely any need to deviate from the process described in the guide – any deviation should be well justified, should have the agreement of the Project supervisor (if you have one) and should be explained in the Project Report.

The best time to start your Project is soon after your last examination in the preceding year. If you wait a few months until the start of tuition for the next academic year you will have to work harder to make a good start. Also, a Project cannot be hurried as you will need time, outside of direct working hours, for reflection and for ideas to gestate. The earlier you begin your Project, the more likely you are to succeed and to be satisfied with your work.

Good supervision support on the Project is valuable in many ways. For example, a Project supervisor should help you to avoid unsuitable or inappropriate topics, too wide or too narrow a scope, and in offering you advice when work diverges from the plan in form or timing. While no assurance of quality can be given, there is generally a greater likelihood of finding a suitable supervisor if attending an institution that is recognised by the University of London, as detailed in the *Programme Regulations*.

However if you study alone, one benefit is an enhanced opportunity for developing a stronger ability in independent working, which will provide a good test of your powers for self-organisation. We regularly see outstanding Projects submitted by self-study students.

Dawson (2009: preface and Chapters 1 and 2) has some useful additional preliminary reading on Project content. As detailed above, this text is required, Essential reading.

1.2. Purpose of this guide

Passing the Project is essential to gaining honours in any of the BSc degrees in Computing and related subjects. The Project is undertaken at Level 3 and is one full course. It is work that you must do largely under your own direction, in the field of your degree, be it Computing and Information Systems or Creative Computing.

The purpose of this guide is to help you to undertake project work successfully. It offers guidance on the kind of work to do, how to do it and how to report it. It contains advice on presentation and quality standards – this is advice that needs to be taken extremely seriously. It also explains the requirements for documentation. Last but not least, it gives advice on the written examination paper. The Project provides experience in carrying out original work to the standards required of an academic investigation.

The assessment is about originality and quality, not length. Many people write far too much and unnecessary content will not gain credit – it may indeed lose some. You have an extremely limited timescale so you need to make plans to use this time effectively. Many students ask how long their Project Report should be. There is no set answer to this question; essentially, it should communicate all of the important aspects of the work you have undertaken in a clear and concise manner. You may find it helpful to look at some of the best Project Reports from previous years, which are published on the VLE (see Appendix A for details).

The format of the final report is very important. You need to remember that this is an academic piece of work. The work you are reporting is your work and not someone else's. Published sources will be important to you but you must not repeat them word for word; you reference them to support what you want to say.

While the large majority of candidates pass the Project, some do fail and of those many do so for reasons that could easily be overcome. It is important to mention a few things (covered at more length below) to which you should pay special attention. Make sure that any material from other authors is properly referenced for good professional practice and to avoid plagiarism. Make sure that you use language effectively so that you avoid having many words but little content. Even if good work has been done it is important to report and present it appropriately. Interviews must be properly documented in order to receive full credit. English usage must be sound. Treat the Project seriously and remember it is your work alone that is being presented and assessed (not that, for example, of your sources).

Many Projects (and Reports) are far too long and lack purpose. The issue is the quality and presentation of your work. You are not being asked to write a textbook but to conduct a piece of original work for an informed readership. Developing an understanding of what to leave out is as important as coherently presenting what you choose to include.

1.3. How to use this guide

This guide is organised into sections. Each of the earlier sections gives guidance at a particular stage in undertaking your Project work. This guidance should be followed closely. The following sections include advice both on what you should do, and on what you should not do. Some guidance is advisory (such as on choosing a topic); it is there to help, no more and no less. If the way you do your Project is sub-standard then your results will not be reliable or valid. Later sections are to guide you in applying and reporting some of the techniques you may be using.

The guide follows the pattern of:

- Choosing a Project and developing your objectives
- Choosing and documenting your methods
- Uses of the topic literature
- Collecting and documenting your results
- Discussing results and drawing conclusions
- Producing your Report
- Studying for the Project, alone or at an institution
- Research methods
- The role of a supervisor
- The Project examination
- Assessment of the Project Report.

It is suggested, very strongly, that you read the whole Project guide first before approaching each area of immediate concern.

1.4. An approach to working on your Project

The Project is a single large piece of work and can seem daunting at first. The general principle that you have used in writing large programs can help you here, namely ‘divide and conquer’. That is to say you need to find a way of breaking the task into manageable subtasks. The suggestions in this guide on structuring your Project will help here.

Even so, many tasks will run over a prolonged period and, if treated as a single item, you may have trouble measuring progress until your target completion date arrives and the job is found either to be done or not done. **Thus it is important to break your work into small chunks, where each chunk can be finished in a week or at most two.** This can be expressed in terms of the familiar sequence, selection and iteration structures that you have met during your studies (see Figure 1, opposite).

The process emphasises interaction with a supervisor (see Section 10). If you have no supervisor then set aside regular periods for self-review (see Section 7.1).

Work includes at least some of: reading, designing questionnaires or programs, programming, carrying out surveys, writing documents, preparing a presentation. Each of these tasks will be discussed in more detail in the following chapters. Making a sensible decision on what to do (the question to be answered or the problem to be solved) and initial planning are so important that they have been given their own cycle.

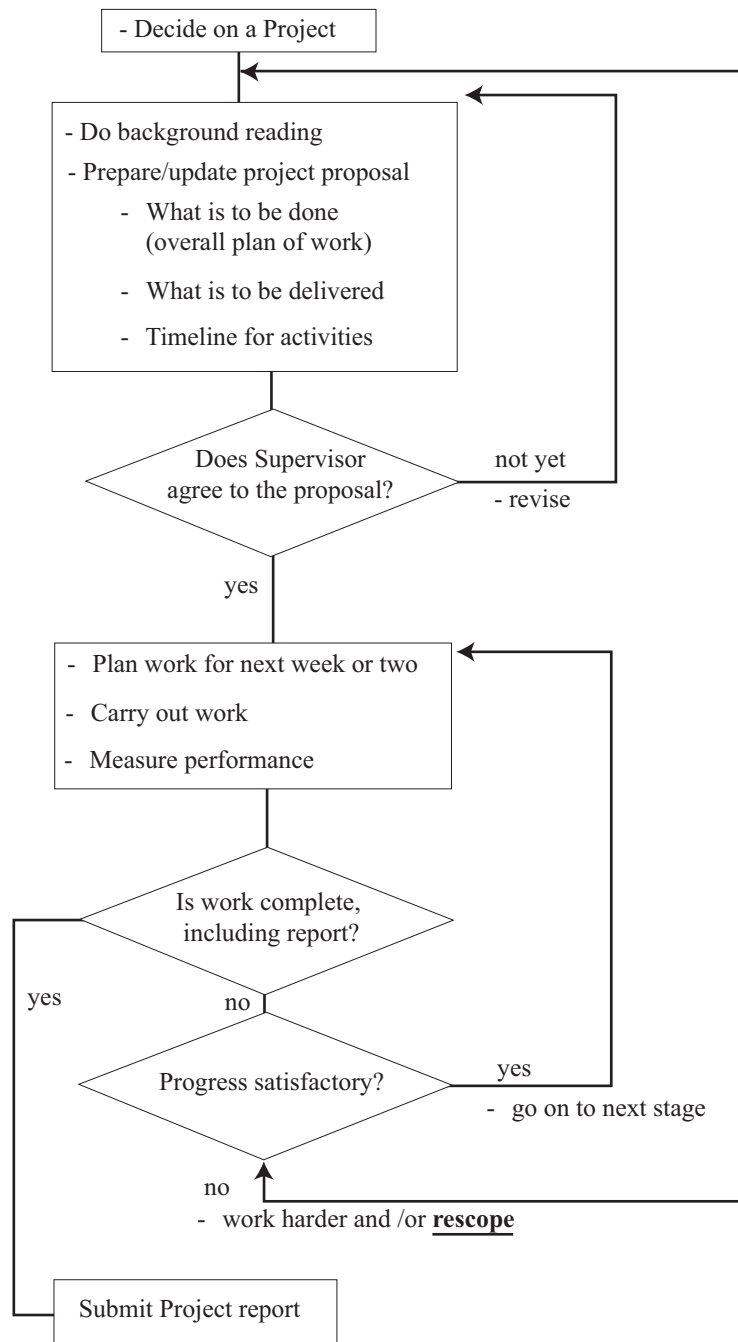


Figure 1: Flowchart of a suggested approach to managing your Project

Note particularly that as well as carrying out the actual work on the Project that you will report, there is a strong emphasis on **planning** and **measuring** within a controlled **timeframe**. These three elements are the key to keeping control of your Project, and a supervisor will check that you do this (see Section 10). Without a competent supervisor you must ensure that you monitor this yourself.

Section 10 includes a list of some ‘do’s and don’ts’ in working with a supervisor, and how to avoid some excuses becoming reasons for failure. If you do not have a supervisor, you have to supervise yourself and you must act with great self-discipline.

Chapter 4 of Dawson (2009) provides very valuable (and much more detailed) further reading on project planning, while Chapters 5–7 discuss how to conduct a project successfully.

1.5. The assessment of the Project

This comprises three elements:

1. The Preliminary Project Report (weighted 10 per cent)
2. The Final Project Report (weighted 65 per cent)
3. The unseen examination (weighted 25 per cent).

To pass the Project course, you must achieve a mark of at least 35 per cent in the examination, a mark of at least 35 per cent in the Final Project Report, and an overall weighted average mark of at least 35 per cent across all three elements (with the weightings as shown above).

The submission deadline for the PPR is specified in the *Programme Regulations* for the session.

Information on what should be included in the PPR and in the Final Project Report is given in Section 6 of this guide, and details of practical matters and deadlines for submitting your Reports can be found in Section 8. Information on the examination is given in Section 11. It is recognised that everything to be done in a Project is not determinable at the start of work and that major aspects of the aims and objectives may change during the Project process. This is one reason for the recommendations given on actively maintaining and updating your Project Plan as the Project progresses (see Section 2.5). For this reason also, it is understood that the PPR may cover rather different ground than the Final Project Report that is submitted several months later. Students should not worry about this. If the Final Project Report diverges from the PPR, then all that is needed is a short account (probably a single paragraph) outlining the differences and how they arose, as part of the Final Project Report introduction.

The information and advice given in the above section are based on the examination structure used at the time this guide was written. You should always check the current *Programme Regulations* for relevant information about the examination. You should also carefully check the rubric/instructions on the paper you sit and follow those instructions.

2. Choosing a Project

High-quality indicators

Appropriate choice of Project topic, based on preliminary research
 Appropriate use of language
 Appropriate depth

Common student failings

Vague language
 Lack of preliminary research
 Lack of depth

A vital first step in choosing a subject for your Project is to understand what makes a good Project, and what kinds of things the Examiners will be looking for in your work.

Ideally, the **Examiners are looking for a Project to address a specific problem, by following the structure of an academic research project.**

This involves the following steps:

1. Identifying a specific question (or questions) to be addressed.
2. Justifying why this question is important and situating it within the body of current knowledge on the subject (which will involve a review of relevant literature).
3. Proposing a means of answering that question (which may entail proposing a solution to an identified problem).
4. Performing some sort of experimental data collection relating to the proposed means of answering the question (which may involve developing some software).
5. Analysing the collected data using appropriate analysis techniques.
6. Drawing conclusions from the analysis which relate back to the original research question.

Notice that there is a clear logical structure to these steps, which all hinges on the question(s) identified in Step 1. This structure will dictate what tasks must be performed to complete the Project, and should also suggest an appropriate structure for your Final Project Report.

Although the preceding comments have been expressed in terms of an ‘academic’ research project, the structure is equally valid if your work is focused on a commercial application rather than an academic research question. After all, if you are developing a piece of commercial software that you wish to sell to paying customers, they will certainly want to know what your software does that other applications already on the market cannot do – and they will want to see evidence to back up your claims, which is exactly what the testing, experimental and analysis aspects of the Project are all about.

Projects which merely involve the implementation of a piece of software or website, with no academic question driving the development, will not achieve high marks. They may, however, be deemed sufficient for a pass if they **demonstrate the application of solid software development**

practice. In addition to what you have learnt about software development during your degree, also refer to Chapter 6 of Dawson (2009) for a good summary of what is involved.

Note that even a Project which is, on the face of it, a straightforward software development task, can – and should – be cast as an academic research project if appropriate questions can be addressed (for example, ‘Can novel feature X improve some aspect of a business process?’, or ‘Can novel user interface feature Y improve customer satisfaction of the system?’). The more specific a question that can be framed, and the more specific the means of analysis, the easier it will be to provide a definitive answer in the Project.

Much more extensive guidance on the nature of research, and on choosing a Project, can be found in Chapters 2 and 3 of Dawson (2009). Do make sure that you read these chapters. Additional resources for further help and guidance are listed in Appendix A of this guide.

2.1. Types of subject matter, by programme

In Computing and Information Systems, the first step is to decide whether you want to concentrate on the computer science side of the course or the information systems side or some mixture of the two. Some titles of previous Projects are given in Appendix B, which may help in making the decision. There is not a sharp distinction between these two sides of the course, though the extremes are clear. A Project involving a detailed analysis of algorithms would almost certainly be computer science and one on the impact of ActiveX on the management of text databases would probably be on the information systems side.

The requirements of both sides are identical, the quality standards are identical and the distinction should be more a first step in choosing your direction than a primary point of concern. Provided your topic has relevance to computing, software engineering, business systems or any of the material covered in the taught part of the course there are no subject restrictions. Guidance on Computing-oriented Projects is given in Section 2.1.1, and on Information Systems-oriented Projects in Section 2.1.2.

In the case of Creative Computing, there is a more integrated requirement, as set out in Section 2.1.3 below.

2.1.1. Computing

Some Projects will lead naturally to extensive non-standard data analysis or the writing of significant software to enable implementation and testing of an idea, and so will involve using either a programming language, or a software package such as a database management system, a spreadsheet, or a Computer-Aided Learning/Authoring system.

Such Projects will refer to books and articles and the documentation of the software in use. The main body of the work is the analysis, design, coding and testing done and this will be carried out and documented according to established and explicit principles.

A programming-based Project will be expected to adhere to high standards of design, coding and testing. It is here that you can show what you have learned in your earlier courses about the practice of software development.

If your Project involves the implementation of an application using a software package remember that your contribution will be expected to be substantial. Your chosen application must be non-trivial.

You may want to do a Project that involves only extended library-based research. This is acceptable in principle but the outcome in practice is often disappointing. It requires a much greater amount of reading, and evidence of critical assimilation of information, than the software-based Project. Library-based Projects are reviews – your contribution is your analysis and criticism of previous work. As with all Projects, the Examiners will be looking for the contribution **you** have made to the subject. These Projects are very difficult to do successfully without wide knowledge and experience of the subject. If you have a supervisor be sure to discuss this carefully and take account of the expert's view, especially if you go against it.

2.1.2. Information systems

There are many areas of information systems that are of general academic interest. The subject relates directly to the application of systems ideas and information technology in the real world.

Many good ideas lead to a series of interviews, a questionnaire survey, the analysis of an existing business system to determine impact on the personnel; whether estimated benefits have been achieved; whether performance is satisfactory; whether a new approach or technology is worth pursuing. The more practical your work, the more useful you will find published accounts of methods and cases.

If you are working (or have suitable contacts) you can consider a work-based Project. Normally you will find that the workplace is very demanding and you will need to be very careful in setting and meeting their objectives as well as your own.

Usually you will find it appropriate to define your workplace as the source of information to be discussed in relation to other published sources – giving your Project a wider interest and contributing to general understanding. **Do not attempt to carry out a whole system development.** This kind of Project is unacceptable. If it can be done in the time available it has little or no complexity and little or no general interest. Instead, you may wish to cover a defined subset of the work involved in system development. This kind of Project can be acceptable, but subject to one caveat. Any specific product (often a data flow model or a set of object models) has to be proven to meet quality standards. The submission of evidence that proves the validity of the work is essential, so that it can be properly assessed by the Examiners. Such evidence could, for example, be reports of workshops, the record of exercising prototypes or a survey of user satisfaction. This kind of work is sometimes better specified as an investigation into the effectiveness of workshops, the value of prototyping or the importance of user satisfaction.

Do not commit yourself to doing too much. The assessment will be based on the academic report submitted and the examination. Even in apparently simple cases this may mean that you can only deliver, for example, the cost-benefit analysis, the system specification or the database design in the time available. The deliverables must include documentation of appropriate testing and evaluation of each item.

In general, you will find that devising an investigative or experimental set-up will be much more rewarding (both academically and personally) than taking on the burden of producing part of a complete system.

You will gain credit for producing a system that has significant useful functionality, meets specified requirements, handles errors and is well documented, but not otherwise.

2.1.3. Creative Computing

Any Project in Creative Computing will make reference to, and use, some ideas and approaches from Creative Computing-specific courses.

The deliverables should normally include a substantial visual, audio, or multimedia content. Apart from illustrations and explanations in the written report, this content must also be provided on a CD-ROM, USB stick or other electronic media, included with the printed report, in addition to the software and executables required for any programming-based Project.

Before submission, it is recommended that you test that your files open on another system, or that you ask a friend or colleague to open them. **Please note that it is the responsibility of the student to ensure that the media files operate correctly under a standard Windows, Macintosh or Unix/Linux system.**

As indicated in the assessment criteria set out in the *Programme Regulations*, any Project worthy of a First class mark will have some noteworthy originality, and this is particularly so where enhanced creativity is explicitly an aspect of the programme outcomes.

As for any academic Project, this creative contribution must be set in a context of other work that is reported, to inform and justify the approach taken, and to provide a cultural reference for the motivation and inspiration of the contribution.

2.2. Choosing your Project and developing objectives

You should give careful thought to the material in this section in order to make a good start to your Project. There is a useful discussion on developing aims and objectives in Section 3.3 of Dawson (2009).

You may not be sure, at the beginning, what kind of Project to carry out. If you are studying at an institution, your tutors will provide you with some suggestions but do not be afraid to suggest an entirely original idea of your own. The ideal Project is one which:

- interests you
- has not been done before
- enhances your professional and academic standing.

If you do not have ideas of your own, discuss the situation with your supervisor. You should also look at the computer press, or other sources related to your degree subject, where you will find articles on current issues and areas of interest. You should be able to find something that appeals to you.

Whether you have an idea of your own, or whether you have picked up a suggestion, your first task is to determine whether the idea has the potential to meet both your interests and the academic requirements. There are two stages in this process:

1. Develop the idea by thinking the problem through in more detail; one idea usually leads to another and a diagram may help you decide what you need to do, what you do not understand and the kind of place you want to get to.
2. After this preliminary exercise, you are ready to see what has been done before (there is no point repeating work that has been well covered elsewhere). You should also consider what resources are likely to be required for what you have in mind. At this point you should carry out a small scale feasibility study, the product of which will be the specification of your objectives.

The single most important guidance at this stage is to define your Project as a **question to answer**, a **thesis to argue** or a **problem to solve**. Any one of these will lead to a clearer path for useful work than simply specifying a topic. This is because a topic tends to invite just general discussion and a survey of the literature which will tend to limit you to context with little or no contribution.

The suggested alternatives more readily lead to identifying interesting work of your own to do (challenge) as well as helping you see how to carry out the preparatory work (giving context) to justify what you then did (contribution).

A question to answer should need substantial effort to resolve it. For example 'In what ways can enhanced web presence aid profitability for SMEs?' is more helpful in leading to what work needs to be done than one that allows just 'yes' or 'no' as an answer; such as: 'Does enhanced web presence aid profitability for SMEs?'. In essence, this latter question needs a one-word answer without directly requiring supporting arguments.

A thesis that you put forward and attempt to prove may be more appropriate for some Projects. A thesis in this context means 'an unproved statement put forward as a premise in an argument' (*WordNet Online*, 2010). In terms of the previous example, one thesis might be 'Enhanced web presence aids profitability for SMEs'.

In either case there is a problem to solve that may itself become the Project title, such as 'The benefits of enhanced web presence for SME profitability: establishing evidence bases and demonstrating their adequacy'.

You will need to show the value of your work in answering your question, in support (or otherwise) of your thesis, or resolving your problem. Often this can be done by setting up some hypotheses (perhaps only one if of sufficient importance) that you can test for appropriateness and significance. An example might be 'The data gathered shows that there is no statistically significant (at the 5 per cent level) profitability benefit for SMEs from enhanced web presence'. Section 9.5 gives a short introduction to hypothesis testing, but background reading will be needed if you have little existing knowledge of statistics.

Let's take an example of idea development. Say you have developed an interest in client-server systems. What really interests you in this area? Ignore answers that are regressive, such as 'it seems important'. It is important but if that is as far as you can go you might as well just read a textbook on the subject.

Perhaps it is an interest in database locking that matters. For example, how does a Database Management System (DBMS) manage to control locks on clients that may be unreliable, where users close down without notifying

the DBMS, where multiple servers are involved, where large amounts of data may have been copied to the client.

Inspiration for Project ideas can often be found in recent conference proceedings. To continue with the example, you could enter a search phrase such as 'Conference DBMS lock reliability 2011 2012' into any search engine.

In the process of developing some more specific ideas, you might find it helpful to draw a diagram like that shown in Figure 2 (these are often known as mind map diagrams – they capture ideas quickly, and informal use is often sufficient). Each of these may provide more than enough material for your Project so you need to investigate further. You locate the appropriate textbooks, spend some time doing internet searches, review the research papers and you soon realise that there is a large body of theory already in existence.

You realise (rightly) that there is no point writing a textbook on the theory but there may be merit in testing how the theory has been applied so you formulate your Project as a question: 'How effectively do server DBMS's manage unreliable clients?' You are now ready for the next stage.

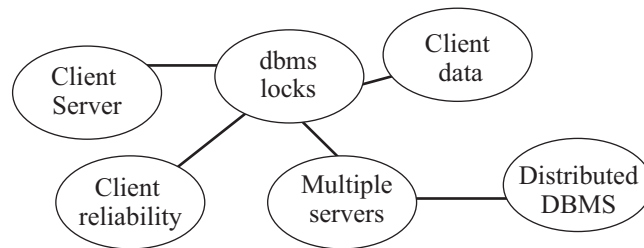


Figure 2: Mind map diagram

You will find that this stage of the work takes a significant amount of effort. Nevertheless, you will find that the clearer you are in what you want to do and why, the more easily you will be able to plan your Project work.

The main problem you are likely to have at the beginning is vagueness. Even when you are relatively certain about the general area you wish to pursue, you may have difficulty in setting out a concrete proposal and a definite plan of work. This is natural at the beginning, but you should move, **within two or three weeks**, to a **definite proposal**. By that stage, you must have a clear idea about what you want to accomplish. Also, if studying at an institution, you may be required to give a short presentation on your proposed Project.

It is common for most proposals to have a wide scope and appear too ambitious initially. You are not expected to try and solve the problems of the universe. A limited objective carried through **systematically and in depth**, impresses the Examiners; one that covers a wide area superficially does not. Set modest goals, and do not attempt more than can be done well. If you have serious doubts, put aside a few days to investigate the feasibility of your Project and your Project plans. If all is well this will enable you to proceed with greater confidence.

Until you have spent enough time doing some substantial work on your Project it is easy to overestimate what can be done in the time available. Often the work takes two or three times the effort that was initially

estimated. One of the benefits of the work process outlined in Section 1.4 is that after only a couple of cycles of planning and measuring progress you will be able to estimate what is possible more accurately. Always leave yourself an ample margin of time to deal with the unexpected.

Summary

1. Decide what question(s) you want to answer.
2. Decide your overall approach to answering the question(s).
3. Formulate exactly what you will produce to give you the answer(s).
4. Determine what previous work has been done that is useful.
5. Decide if the work is feasible in the time available – if not, reduce the scope.
6. Decide if the work is technically feasible: Are the right tools available? What other resources will be required? Do you have access to any data that you will require?
7. Plan the practical element of your work.
8. Produce an outline structure for your Report.
9. Now execute your plans.

2.2.1. Unsuitable Projects

Some approaches to Projects that may make the work unsuitable have already been mentioned above.

However, some topics are unsuitable in themselves for any degree in Computing and related subjects, be it Computing and Information Systems or Creative Computing.

Clearly this includes any topic with no computing content at all. Apart from some basis in computing, which may include information systems in Computing and Information Systems, for Creative Computing there must be some aspect of creativity involving computer use. One guide is to consider the extent to which the intended Project involves material or concepts from other courses in the degree programme; if such an involvement or relationship is lacking then there is a high risk that the Project will be unsuitable.

Nevertheless, some topics that have some apparent link to the subject are still considered unsuitable by the Examiners for the degree. Such subjects include implementations of games or other items that have no direct computing relevance apart from the production of a computer program. It may be that some relevance may be present through consideration of human–computer interaction or artificial intelligence issues, but then these should be the focus of the work – the game implementation itself is not the basis on which the work would be assessed.

2.2.2. Benefits of, and problems with, work-based Projects

A work-based Project offers some advantages. One is that you will have some detailed knowledge of the background. This will not only save you some time in Background reading (compared to a student who picks a topic of interest but of which they have no direct knowledge) but may mean that your employer is prepared to allow you to use some of your employment time to work on your Project. Your employer may also provide access to resources that will help you in pursuing your work.

Conversely there are consequent dangers that you may face. One is that your work may lead to reporting of commercially sensitive material in order to be thorough and your employer may object. To counter this, be sure to obtain a permissions letter from your employer at an early stage. This should set out what you may do and report. Include this letter in your Report as an Appendix as it helps to clarify the framework within which you studied. Cross-reference this from the main text as appropriate, such as when setting out the scope of your contribution within a work-based group, or explaining why a particular (work-based) methodology was used.

Another danger that may arise in a work-based Project is that your employer may change their mind about what they want you to do half-way through the Project. A permission letter can help mitigate this danger, by setting out a clear agreement between you and your employer at the start of the Project, detailing exactly what you will deliver, in addition to what you may or may not report.

Another aspect about which you must be especially careful with a work-based Project (although this is true for any Project) is to explicitly identify the parts of the work that are, and those that are not, your own. This is because you may be using a company methodology (ensure it is clear that this is not your product); or results already produced by the company (not derived by you individually as part of the Project), or you may be working as part of a team. In this case, it is important to state explicitly what you did and what others did. This is good professional and academic practice and you will gain credit from the Examiners.

The importance of this last point cannot be emphasised too strongly. If the University of London International Programmes Examiners cannot identify the work that is yours, or have reason to believe that there is too much work to have been done by you alone, you will gain no credit and thus risk failing.

On completion of your Project, you should obtain a sign-off letter from your employer, and include it as an Appendix in your Report. This should include confirmation of work done, a brief evaluation and a statement of acceptance, if appropriate. You need to be clear about the different reporting requirements that may exist for an employer and for the academic report. A report for your employer is likely to be short, containing results and recommendations with a short justification. Your employer can ask for more detail at any time later if interested.

By contrast, the marks you obtain from the Examiners will be for the academic report that you submit. Part of what makes it of academic interest is the context of your work and sufficient detail on methods to enable reproducibility of test results. This enables others to see how your work fits into the wider body of knowledge on the subject and to evaluate its relevance to their own studies.

Thus an academic report will include a substantial literature (and other resource) survey, with detailed analysis to identify elements relevant to (namely, supportive of) your planned line of work. More information on report structure is given in Section 6, and on the literature survey within Section 3.

Only your academic report is submitted to the University of London and so you need to be very clear on the differences between requirements for an academic- and a workplace-oriented report at all stages of working and writing.

Lastly, and related to the earlier points, it is very important to avoid your work being too narrowly focused on company requirements to the point where it has no interest or applicability elsewhere at all. That is, your Report must have some interest other than just to you and your employer in order to have any chance of academic relevance.

2.3. Statement of objectives

High-quality indicators

Sound justification
Specified results

Common student failings

Confusion of company and Project objectives
Failure to define results

Having established the overall aim of your Project, you need to define a set of objectives that you intend to fulfil in order to achieve your aim. Objectives are specific, quantifiable achievements that represent progress towards the overall goal of the Project. They establish the scope, value and planned results of your work. The aims and objectives are also known as terms of reference.

Reading activity

For further discussion on defining aims and objectives for your Project, refer to Section 4.2 of Dawson (2009).

Your aims and objectives will be described in the Introduction section of the Final Project Report. The Introduction should include a justification for doing the work in the first place – that is, a brief explanation of why the aims are important. It should then take your Project aim(s) as a question and explain what will constitute an answer to that question. In doing so, the Introduction should define the results you will produce (the Project's objectives) to answer the question (the aim). What you are doing at this stage is specifying your deliverables.

2.4. Choosing and documenting your methods

High-quality indicators

Clear and complete relation to deliverables
Considering the validity of deliverables

Common student failings

Confusion of development methodology and Project methods
Failure to provide detailed analysis
Failure to discriminate between, and select from, available techniques

You should give careful thought to the material in this section in order to carry out an effective Project. It will also help you to complete the Methods section of the PPR.

When you know what you need to produce, you can then decide the best approaches to get the material you need.

Reading activity

Now refer to Dawson (2009: Section 2.4), which includes a review of research methods.

Dawson classifies these research methods as action research, experiment, case study and survey. Your own Project may use two or more of these classes. You should be aware of the possibilities to help you make more appropriate choices to achieve your particular objectives.

Library work is essential and you should document your search strategy – note that strategies that do not produce useful information should also be reported – see Section 3 below.

If your Project is in any way experimental then you will need to investigate experimental design very carefully. The first point is that you need to be sure, and report the reasons for your belief, that the experiment will produce the required results. The second major point is that experiments need to be controlled so that you and the reader have confidence in the results. These too need to be reported. It is a common failing to report results without sufficient detail of the experimental method and controls. For experiments and surveys that involve human subjects, another common failing is not reporting on what basis the subjects were selected.

Investigative methods themselves need to be defined and Section 9 of this guide gives outline advice. You need to relate your choice of such methods to the objectives, and you need to be discriminating in your choice.

Remember to document the details of your choice – textbooks usually give a general view, and you will need to explain how it is appropriate in your particular Project.

You should follow requirements rigorously and plan for the documentation and analysis of your findings. On matters of interviews, surveys and observation, you will find many authoritative sources. It is a common failing to investigate unselectively without regard to the outcomes. When a series of interviews has been undertaken there should be a report of each interview and a document that analyses the interviews as a set; when workplace observation has taken place it is necessary to report the circumstances, why they were chosen as well as the resulting analysis of the findings.

When you have worked out how you are going to achieve your results it is often useful to get a second opinion. You will find that your supervisor will ask you many questions relating to your proposed methods and their validity.

It is almost certain that documenting the choice and application of your methods will be a substantial part of your Final Report (see Section 3 below). In some cases, such as those that involve surveys, it can be the largest section of the Report. If you are using a commercial or previously published methodology, do not repeat the general principles (but give full citations) – concentrate on your interpretation and method of use.

2.5. Planning aids for executing your Project

If you have a supervisor then they will comment on your planning. You are strongly recommended to find a suitable supervisor if at all possible. If you have no supervisor then read Section 7 with particular care. In any case, read Section 10 for its planning advice.

One of the most useful planning aids is the Project Plan, the original version of which is submitted as part of the PPR. The final version of your Project Plan must be included as an Appendix in your Final Project Report. It will help the Examiners to see what you intended and may help them in marking your Report more sympathetically.

Perhaps most importantly, on a day-to-day basis, you should use the Project Plan as an evolving planning document, updating an electronic copy frequently in the light of results you obtain and of progress reviews (whether with your supervisor or alone). Specify things to do in the next week, two weeks, month, and so on, so that you can **measure** your progress and rescope if necessary (for example, if you get behind with deadlines) at an early stage while you have time to recover. As time goes by, your planning (meeting deadlines) will get better and you will be able to plan the remainder of your work with more confidence. Near deadlines are important in this. If you have only distant deadlines (for example, it is November and the next deadline is end February) then only at that later time will any failure to be on target emerge, and then it may be too late to recover effectively by rescoping to include adequate realisable objectives. Dates set in the Production Schedule section of the plan should reflect achievements in the Key Milestones section.

Reading activity

For further reading on Project planning and risk management, in addition to Sections 7 and 10 of this guide, see Chapter 4 of Dawson (2009). Also have a look at his useful comments and advice on time management with respect to the Project (Dawson, 2009: Section 7.3).

3. Uses of the topic literature in your Project

High-quality indicators

Clarity of search criteria to permit follow-up
Depth of insight in analysis and comparison of sources
Clarity of expression and relevant narrative in survey
Clear and complete relation to deliverables

Common student failings

Lack of a clear narrative
Lack of explicit information about search strategy and criteria
Lack of an analysis to link what is reported with what is contributed in later results

Reading activity

The Essential reading to accompany this section is Dawson (2009: Chapter 5).

3.1. Introduction

In order to give value to your work academically, you need to place it in an appropriate context. Providing a context for your problem and justifying your approach to its solution is generally achieved by examining and analysing what others have done, as reported in some form of publication – the subject literature. Thus searching and evaluating literature sources will be at the heart of providing a context for your work, and writing a review of the relevant literature will be a vital part of your Project Report.

Taken together, the literature search, evaluation and survey contribute to several aspects of your Project, with weighting depending on your Project topic and objectives. These aspects include the Terms of Reference, Methods, and in some cases, the Results. For example, if you have a clear idea of a specified system or subsystem to implement, review of the literature will help identify possible approaches and algorithms, comparison providing justification of choices made for the Project.

Usually the Literature review will be a distinct chapter of your Report. Its location and extent will depend on the nature of your Project. As indicated above, for many candidates it will provide the background to a rationale for the choice of method or methods to be used. In the – often more challenging – case of a Project that is library-based (but see, for examples, provisos in Section 2.1.1) then the Literature review will become the main part of the Report, with the evaluation extending to detailed analysis to enable a contribution, in the form of well-argued conclusions, to be made.

In general, a Project Report with little or no literature survey will provide too little context and justification of any work done to enable a pass.

Forms of literature, reference lists and citations are covered elsewhere (Sections 6.3–6.5) and, with information sources for literature, in Dawson (2009: Sections 5.2–5.3).

As emphasised in Dawson (2009: Section 5.2) the literature survey process does not consist of a fixed number of steps but rather a cycle of search definition, search execution, evaluation and writing, in turn leading to reflection that enables a refined definition for an enhanced search. This structure should be familiar through its similarity to evolutionary prototyping in software engineering, albeit that this is for an expanding product while the literature survey, as it expands, also converges on a core focal point – giving context to the problem to be solved or question to be answered.

3.2. Literature search

In general terms, an important aspect of academic work is to explain what you do well enough to enable other workers to reproduce the results you report, enabling your claims to be verified as mentioned in Section 6.2e. This principle of accurate explanation applies to the literature search. For example in internet searches, report the date of the search (as results vary with time) as well as the search engine used and precise details of search criteria (see also Section 6.2e).

As an undergraduate you have limited time to search for relevant literature and are not likely to find all that the Examiners know and consider important. The Examiners understand your time restrictions and will make due allowance for limitations in what you find, provided you tell them explicitly what you did. Thus the Examiners are interested in how you looked for the information that you did find – and it is good academic practice to report this in any case. Showing an intelligent approach to your searching is something for which they can give credit. They will certainly look for you to have been ‘systematic’ (Dawson 2009: Section 5.3.1).

Dawson also emphasises the need for materials used to be published, and ‘recognised’. In this regard he warns against the use of unreferenced materials such as blogs and other personal work found on the internet.

However, in the context of this course, we would allow limited use of such personal materials as long as they are publicly available – for example, with a web reference. The vital proviso is that you must critique rigorously as to quality. Even company sales materials may be relevant but with a strong warning to be aware of the possible deficiencies. As Dawson remarks, refereed work will have been checked for its value and hence absence of gross defects – it has ascertained provenance. By contrast, personal expressions of opinion on the internet, sales literature and other such materials will often be making a point in a biased manner, perhaps intentionally ignoring well-known information that modifies or invalidates claims made.

Nonetheless, much good material can be found on the internet, including up-to-date information on the research of many individual academics. Evidence for the soundness of this can be deduced from the URL, such as if it indicates the computer science department pages of an established university. For example, URLs for UK universities all terminate with ‘.ac.uk’, preceded by an identifier for the university or university college, such as ‘lon’ or ‘london’ for the University of London and ‘gold’ or ‘goldsmiths’ for Goldsmiths University of London. Thus the Department of Computing at Goldsmiths is at: www.goldsmiths.ac.uk/computing/

3.2.1. Recording references as they are found

Reading activity

Dawson (2009: Section 5.3.5) mentions the value of making a note of the reference for any material you read. We extend the recommendation of Dawson (2009: Section 5.4) – to ‘use a computer to do this’.

From the beginning, for each publication you read, make a habit of filing a record of the full reference (in standard form) and at the least some key words or phrases relating to it. This has more than one advantage. One is that later on you may find some other material on the same topic; remember you have seen something similar and wish to compare it with what you read earlier (for example, to evaluate the opinions of the two authors critically). With your electronic record you can simply search for the relevant key phrase to identify the source and hence speed up your comparison. By contrast, if you have no record and you cannot recall the details of the first source, you may spend a long time repeating internet searches or searching through piles of printouts, perhaps never to find the important comparison. Second, your electronic record is the basis of your reference list and also provides stubs (topic headings) for expansion into the text for your literature survey. That is, when you start writing parts of the Report at an early stage, this will help you avoid being overwhelmed by the amount of writing needed (as often happens when writing the body of the Report is left until late on in the Project process).

In selecting literature to read, consult with your supervisor if you have one. Whether or not you have a supervisor, do follow the advice in Dawson (2009: Section 5.5), to help you decide if an item is worth reading in full, by considering timeliness, author reputation, and reading the abstract and other summary sections.

Use the ‘tips for performing a literature search’ (Dawson, 2009: Section 5.3.5) as a checklist to help you keep control of the process.

3.3. The Literature review

A crucial point discussed by Dawson (2009: Section 5.6) on one purpose of carrying out the Literature review is **to avoid repeating the work of others** (the other quoted points relate to positive benefits already noted). Lack of care in this and in referencing can all too readily lead to a justifiable charge of plagiarism.

In the same section, Dawson also warns that you should avoid padding with irrelevant material just because it was among the things you looked at. Your Literature review should only discuss work which is of demonstrable relevance to your Project. Avoid the common mistake of writing a large Literature review which includes material of a very general nature of no specific relevance to your topic, or specific material on topics which are far away from your Project subject. **There is no prize for writing an overly-long review; the Examiners are looking for a concise summary of just the work that is of specific relevance to what you plan to do.** In the reference list also avoid listing items that you have not read and referred to in your Report and ensure everything you do refer to in your Report is in the reference list. A sprawling ‘bibliography’ that is not referenced, and may just be a hit list from a web search, is of no value and is inappropriate.

Dawson also warns against writing a ‘review’ that is simply a sequence of entries describing each item you have read. This has little value, in particular as there is little intellectual input and none on the vital aspect of comparing and contrasting what different authors have to say so as to inform and justify decisions taken. For the same reasons, you should avoid writing a review that is essentially a tutorial. To help show good practice, Dawson (2009: pp.107–08) provides an example of a review section as well as a commentary on its features. You will have already developed some skills in comparative writing through assignments for earlier courses, but it is worth paying attention to developing your skills to write the best Literature review that you can.

3.4. Evaluation of the literature

You should read Section 5.5 of Dawson (2009) for some good advice here. In particular, note that evaluation involves critical reading in the positive sense of including looking for good ideas that can help you. For example, if looking for methods or algorithms to use, you will read about various possibilities and decide which is most appropriate for your application or problem. You need to explain the basis for your judgements as part of your evaluation. Dawson lists a number of points you should take into consideration when judging the quality of the work you are assessing, and these are quite general.

You will need to address the specifics of your own problem as well. As a simple illustration, consider a familiar problem of sorting records on a given key. Here there is a readily available and extensive literature that you should use to guide you in a choice of methods according to the number of records, the dataset size, and the likely properties of the data prior to sorting. That is, some sorting methods perform well on average over many datasets but have very poor behaviour on data with particular properties, such as when initially in reverse order, or partly so. If you know some features of your source data, such as being in random key order or having sorted subsequences of records, then you can optimise your choice and justify it.

Often the decision basis will not be so clear cut, such as when choosing a method for the design of a business process, where constraints may be unclear or may be very uncertain for a novel business area.

Overall what you should demonstrate are intelligence and depth of thought ‘beyond mere description’ (Blaxter et al., cited in Dawson (2009: p.104)), and take into account the other facets of evaluation listed from Blaxter, ‘relates different writings’, ‘[do] not take...at face value’, and be aware of ‘research writing as a contested terrain’.

You must show that you are joining that contest intelligently and with sound justification for what you claim or decide.

3.5. Developing your methods

Having read and evaluated a substantial body of literature related to your area of interest you will have been able to identify a challenge (a problem to solve or a question to answer) that is appropriate in scale and difficulty to address in the Project.

Further, having read Dawson and others on approaches to investigative, experimental and other work, you will have learned much about the methods for carrying out such work, especially in relation to what you plan for your own Project. Thus you are ready to select, with appropriate

justification recorded in your Project Report, appropriate methods to meet your Project challenge and begin to provide some appropriate contribution.

What you select and how you proceed will depend on your individual plan. For example, if your Project involves a system design and/or some software development you will know what development process (waterfall, evolutionary prototyping, etc.) is appropriate for your problem type, and be able to justify its choice.

As another example, if your Project involves a questionnaire survey as part of data gathering, for subsequent analysis, you will have learned, or know where to learn, about questionnaire design, prototyping and redesign. In this case you will also have learned, or be learning, about identifying the target population for your questionnaire, how to select an appropriate (unbiased) sample for questionnaire circulation, and how to account for, or discuss, possible biases that may arise from the questionnaire fraction returned not being representative of the sample chosen.

Where your study generates data (e.g. from execution of software on datasets or from questionnaire returns) you will have learned, or be learning, about appropriate methods for analysis. For example, in the case of questionnaires, your prototyping will have ensured that you have a concise set of non-overlapping questions that cover the information you need to gather to enable analysis (such as the interrelation of effects in different questions). As another example, if your results follow from implementing and executing some algorithms that you wish to analyse for efficiency, you will understand how to investigate the effects of different forms of input (such as the degree of pre-ordering or randomness in data for sorting or database searching) in relation to what is known already in the literature and how to enable appropriate comparison with it.

4. Collecting and documenting your results

High-quality indicators

Clear and complete results clearly related to the described methods

Common student failings

Failure to document in sufficient detail

Failure to analyse at all

Failure to analyse as specified in the objectives

Many people benefit by keeping a diary, which is updated daily. Otherwise, when the writing-up is being done long after an action, it can be difficult to recall everything that you need to remember. However, if you keep appropriate records, any time you have an idea, the necessary evidence and support can often be found in your notebooks.

With experimental work especially, but also with some other areas – such as the production of test results – make a point of devising the method of recording before you start. You will find that an initial systematic approach will save you much time later.

When you are collecting results, keep asking yourself whether or not they are part of your objectives. Make sure that where necessary you produce analyses that correlate directly to the issues that arise from the results.

Keep notes on inconsistencies and problems to make use of later in your Report.

If something seems to be going wrong then you may need to go back to your selection of methods and try again in a different way. You should report such problems, in the Methods section, but do not hesitate to remove unreliable material from the results of the Project Report.

5. Discussing results and drawing conclusions

5.1. Preparing the discussion

When you get to this stage you will have made a lot of progress. You will have your objectives, your results as experimental data, survey results, analysis/design documentation, and/or documents relating to investigations and decision-making. You will also have a record of every source consulted along the way. These are the inputs to your discussion. Your task at this stage is to bring all this material together and explain its significance along with your findings and ideas.

In this section you will want to discuss the issues arising from your findings in the context of other published (and unpublished) work. You will want to point out where different authors have had different findings and discuss why this might be the case. Where your findings confirm other work this should also be reported.

You will also want to discuss your findings themselves. Point out their immediate significance, areas where they are possibly limited or less reliable than you anticipated. Go back to your justification for doing the work and discuss the results in connection with your stated purpose.

A common weakness in Project Reports is a lack of adequate discussion of the results. For the reasons stated above, it is essential that you provide an appropriate level of discussion. This will then lead you to the final section of the Report, in which you draw your conclusions.

5.2. Concluding your Report

High-quality indicators

Clear connection to Project achievement as reported

Common student failings

Addition of new material

Confusion with evaluation

The key factor here is not to introduce any new material into this section. It is a conclusion that primarily brings the discussion into sharp focus. It draws themes together to provide emphasis to the major issues arising.

It is important to provide cross-references back to your discussion so the reader can look back to the facts and arguments on which your conclusions are based. Secondly, the conclusion can and should point to the future. Perhaps you have identified further work that needs to be done; perhaps you have made predictions that can be tested in the future.

This section should be concise, clear and definite and should not be confused with your personal evaluation.

6. Reporting your Project work

Reading activity

For useful advice on writing your Project Report, see Dawson (2009) Chapter 8.

Please note that any specific directions in this guide, such as on the format of the Report, should take precedence over suggestions you may find elsewhere, unless you provide explicit justification in terms of the nature of your own Project work.

6.1. The Preliminary Project Report (PPR)

The Preliminary Project Report (PPR) must be submitted in mid-January. The actual deadline for submission is specified in the *Programme Regulations* for the current session. One of the primary purposes of the PPR is to encourage you to start working on the Project early in the academic year. Furthermore, it provides an opportunity for you to reflect upon your progress at an early stage, and to re-evaluate your plans if necessary. From the academic year 2012–13 onwards, **all PPRs must be submitted electronically via the VLE (no hard-copy submission is required)**. The Examiners will provide constructive feedback to all students, shortly after submission of the PPR.

The number of words in the PPR, excluding the title page and the Appendices, should be between 2,000 and 4,000. The PPR is much shorter than the Final Project Report and its reporting requirements lighter. The PPR is essentially a milestone for provision of a dated summary of progress and plans.

The PPR serves several purposes, including:

- providing an additional motivation for an early start on the Project
- helping set some useful targets for delivery of intermediate results and their documentation
- forming one of the bases for a mid-session review of progress on the Project; the specified structure aids coherent and consistent review, especially where done in conjunction with a supervisor
- providing an opportunity for the Examiners to provide constructive feedback while the Project is still in progress.

6.1.1. The format of the PPR

Reading activity

See Section 2.3 of this guide, and Section 4.2 of Dawson (2009) for discussion on defining aims and objectives.

The PPR must adhere to the following structure:

Title page	Giving the title, student name, date, degree title (Computing and Information Systems or Creative Computing), supervisor name, name of local institution attended (or write 'Self-study'), University of London International Programmes student registration number.
Introduction	A brief statement about how you chose your Project, whether or not it is work-related, which courses from your degree programme are relevant to your Project work, and whether or not you have a supervisor.
Aims and objectives	State what questions you set out to answer (aims), the deliverables you are going to submit (each deliverable will be closely tied to an objective), and the justification for how these objectives will enable you to meet your stated aims.
Methods	State how you intend to achieve the aims and objectives, and why you intend to do it this way.
Project plan	Include a schedule detailing all of the tasks required to complete your Project (including writing each section of the Final Report), along with key milestones. This can be in the form of a Gantt chart or similar planning diagram if you wish. Large tasks should be broken down into a number of sub-tasks, each of no more than around two weeks' duration.
Progress to date	This is a description of the work you have done up to this point. This may include, for example, a summary of literature reviewed, and a description of findings, analyses, results of calculations and experiments performed. This section is important! Be sure to write about what you have actually done up to this point, and not just about what you plan to do. Also, at the end of the section, include a few sentences about how your progress to date compares with your Project Plan.
Planned work	Where the Project is now and what should be done next.
Appendices	Appendices should be cross-referenced in the relevant section of the main text. No Appendix should be present unless cross-referenced from the main text. The Appendices should include any permission letters that give provenance for a work-based Project, or for access to specific organisations or materials (see Section 2.2.2 of this guide).
Reference list	Giving full publication details of all literature referred to in the PPR. See Sections 6.3 and 6.4 for format details. This list will generally be much shorter than that for the (later and much larger) Final Project Report.

6.2. The Final Project Report

The Final Project Report is the main deliverable for your Project work. Any other deliverables, such as source software, executables or media results in electronic form (CD-ROM, USB stick, etc.) that form part of your submission must be included with the printed Project Report. A suggested structure for your Report, which will be suitable for many types of Project, is shown below.

Reading activity

For further discussion on report structure, and alternative suggestions to fit different types of Project, see Section 8.2.5 of Dawson (2009).

Whatever structure you decide to adopt, you **must** include the Title page, Contents page, Reference list and Evaluation sections, as described below:

Title page	Giving the title, student name, date, degree title (Computing and Information Systems or Creative Computing), supervisor name, name of local institution attended (or write 'Self-study'), University of London International Programmes student registration number.
Contents page	Give the section structure and page numbers.
Summary	A one-page summary of your work to help people to decide whether to read it and give an outline of important features for those who do not.
Introduction	Stating the Project's aims and objectives: what questions you set out to answer, the deliverables you are submitting, and the justification for the work you have done.
Literature review	Explains the existing context in which you are developing your work.
Methods	The methods chosen, their justification and how they were employed. This will make reference to the Literature review that informs and justifies the choice of approach to answering your question or solving your stated problem.
Results	Your findings, analyses, results of calculations and experiments. If your Project is of the kind based on analysis of the literature, and possibly other sources, this analysis will provide results. Warning: this form of Project is difficult to do well except with great length and depth of experience.
Discussion	What your results mean and how they can be interpreted, pointing out strengths and weaknesses of the results.
Conclusion	Where the problem is now, what you have done and what should be done next.
Appendices	Detailed technical material is often best presented in an Appendix so the main Report can be read without a break. Appendices should be cross-referenced from the main text as relevant. No Appendix should be present unless it is referred to in the main text.

	<p>Include a copy of your Project Plan as an Appendix.</p> <p>Include any permission letters that give provenance for a work-based Project, or for access to specific organisations or materials.</p> <p>If you have large amounts of experimental data, survey data, etc. that you wish to include in an Appendix, it is permissible to include this electronically (on an attached CD-ROM, USB stick, etc.) rather than taking up dozens of pages of Appendices in the written Report. If you do this, include a small sample of the data in an Appendix of the written Report. In the main text of the Report, be sure to refer the reader to the Appendix and to the electronic version of the data. Ensure that the data are organised in a clear and logical manner on the digital media. The data should be presented in a widely used format that can be viewed in Windows, Mac and Linux. If an Examiner is unable to open a file, you will not get credit for it.</p>
Reference list	Giving full publication details of all literature referred to in the Report. See Sections 6.3 and 6.4 of this guide for format details.
Evaluation	A personal statement, not part of the Report, about the effectiveness of your work, and its usefulness to yourself and others.

Note the following in more detail:

a. **TITLE PAGE.** The title page **must** follow the layout below.

- title
- author
- date
- supervisor (if none, state 'None').

And contain the following text:

'Submitted as part of the requirements for the award of the Degree in <your degree name> of the University of London.'

<your degree name> is the programme for which you are registered, namely one of:

- *Computing and Information Systems*
- *Creative Computing.*

b. **CONTENTS.** All Reports must have a contents page that indexes all sections and appendices in the Report with both their section reference and physical page number, so the pages must be numbered throughout.

c. **SUMMARY.** This can also be denoted as an **ABSTRACT**. All Reports must have, as the first section, a Project summary or abstract. This is not an introduction. It extracts the key findings from your work, usually concentrating on the important results you have achieved. The summary or abstract is the last thing to write. Only when everything is finished do you know what has to be summarised. You should include

some keywords at the end of your summary, to indicate the subject area of your work.

- d. **INTRODUCTION.** All Reports must include a precise statement of aims and objectives in the Introduction. Often there is a high level statement of purpose, followed by a detailed specification of the deliverable(s) you will produce to achieve the purpose(s). The original purpose for doing the work needs to be included in the objectives, as does any deviation from the pre-specified objectives within the Final Report.
- e. **LITERATURE REVIEW.** All Reports must include a literature review to explain how the work fits within and contributes to existing knowledge in the area.
- f. **METHODS.** All Reports must include the methods, discussing how each technique was used, for what purpose and with what effect. Vague statements such as 'I went to the library' or 'I used online information sources' are totally inadequate. Everything you do should be documented sufficiently that someone else can repeat your work.

Examples

If interviews have been conducted, these must be accompanied by interview reports (as Appendices) and you should make clear the purpose of the interview, how it was planned and structured. There would normally be a document analysing any set of interviews, which would indicate the issues raised and where or to whom they related. This analysis would be included as another Appendix.

Library and online searches should be documented by defining your objectives precisely (what you were looking for), the strategy (what you searched or intended to search), your findings (what you found, what you did not find, where you searched in vain), and conclusions about the state of the topic from the results of the search. This is covered in more detail in Section 3 of this guide.

Design and analysis techniques applied to situations where there are decisions to be made as to the approach taken, or relating the final outcome, should be reported as such.

In many cases you will want to describe the alternative outcomes, explaining how they are different and the reasons for choosing one in preference to the other. In some cases the choices, because they have to be worked through and evaluated, will be the major work of the Project.

Where you need to apply specialist techniques you should investigate the subject in your library as well as seeking expert guidance, initially, from your supervisor (if you have one).

Examples where unforeseen problems often occur are in the use of statistics, in benchmarking and other performance tests and in survey methodology.

- g. **RESULTS.** All Projects produce results. Examples of results include lists, tables, other reports and formal experimental results. These results must be clearly identified and presented as such. All results obtained should refer clearly to the methods used to obtain them. If the results are less reliable or useful than you expected, the shortcomings must be clearly stated.

- h. **DISCUSSION.** Discussion of your results must be clearly presented in a separate section from the results themselves.
- i. **CONCLUSION.** In the conclusion you draw together all the points made earlier, both looking back to the objectives set and what has actually been achieved, as well as looking to the future by specifying the work that could be done next.
- j. **TECHNICAL DETAIL.** As technical material is frequently dry and extensive it is sometimes better to move it out of the main body of the Report and place much of it in an Appendix instead. In the main body of the Report you may include examples and refer the reader to the Appendix where necessary so that they may see full details of the material if they desire. The main body should read easily from beginning to end.

An outside reader is not always interested in academic aspects such as the choice of methodology, the difficulties encountered, etc. The Examiners are interested in such matters and they must be described.

- k. **APPENDICES.** Appendices must be placed after the main body of the Report but before the References. **The Report itself must cross-reference the Appendices where necessary; do not include an Appendix which is not referred to in the main text, because unless you say that it is there, the reader (and Examiners) may not find it!** Every Appendix should have a clearly-defined purpose and must be cross-referenced somewhere.
- l. **DOCUMENTATION STANDARDS.** The correct documentation for any formal analysis and/or design methods used during your Project must be adhered to in the Final Report. Consult your supervisor, if you have one, about documentation and quality standards. For example, for software read Dawson (2009: Section 8.6).

In many cases you will be using established standards and will cite the source of these standards in your Report. Any variation from the standards will need to be defined, justified and its implications discussed. Take special care to ensure that you do this work accurately.
- m. **REFERENCES.** This section must be a list of references consulted with full attribution and the text must contain full cross-referencing. Note: all Appendices require citations where necessary. This reference list when done well is an important deliverable of the Project. It should contain only items that are cited in the text and each citation must have a corresponding entry in the reference list. Citations without a reference list entry and uncited reference list items constitute a grave defect.

Cite all sources including ephemeral items (such as sales literature) in the same way as any other.
- n. **EVALUATION.** The Report **must** finish with an evaluation. This is your assessment of the quality of your own work. It is not an opportunity for self-justification or the place to make excuses or to make your conclusions. Explain how well your objectives have been achieved, what you would now do differently, where things worked well and where they did not, and what you have learned on the way. This section comes after the References.
- o. **COPYRIGHT.** Copyrighted material **must not** be included without the written permission of the copyright holder. Do not include sales literature, newspaper articles or downloaded web documents.

- p. Always remember that you are presenting your own work and your own ideas. Do not copy work from any other source (whether published conventionally or electronically). Heavy paraphrasing (just changing a few words) will be treated as plagiarism.
- q. Lastly, as general principles:
 - Try to put yourself in the place of the reader; in this case, of someone who is well-informed in your professional field.
 - Do not write a textbook; there are plenty of these around already.
 - Do not waste the reader's time on general introductory materials. Give the citations only. The reader does not need an introduction but may need to refer to sources in the subject area.
 - Do make sure that you define the technical terms used carefully, again giving relevant citations. A fold-out Glossary is sometimes useful.

6.2.1. Submitting code

If software development forms any part of the assessable material in the Project, then listings should be provided as an Appendix to the Project Report (duly referenced from the main text where the development of the software design is reported) **and the software should be included on a CD-ROM, USB stick or similar electronic medium accompanying the Report.**

Such provision should include the source code (corresponding to the hard-copy listing in the Report Appendix) and an executable that will run, directly from the supplied media, on a standard Windows, Macintosh or Unix/Linux system in either demonstration or full version. That is, any non-standard facilities or libraries need to be incorporated. For any such software a short user guide should be included as an Appendix to the Project Report.

It is extremely important that the Examiners can see the source code that you have developed. Sadly, in the past, some students have submitted Reports which include lots of fancy screen-shots, but no source code or executables. In this case, the Examiners have no evidence that you have actually written the software described – for all they know, the screen-shots might just be mock-ups!

In cases where it is impossible to provide a full working version of the software (for example due to licensing issues with third-party libraries, or if a website has been developed that runs on a server), then, in addition to providing printed listings of your code in the Appendix of the Report, you should make all reasonable efforts to allow the Examiners to see the code running; this may include, for example, providing videos of the running software on electronic media submitted with the Report.

If you have developed a website and provide a URL to a server running your site, the Examiners cannot verify when the code on the server was last updated (it should not be modified after submission). Therefore, although you may think this is useful, the Examiners cannot give any credit for this kind of demonstration. **Any demonstration that you would like the Examiners to consider when marking your Project must be provided on electronic media submitted along with your Final Project Report.**

If you use any third-party libraries when developing your software, be sure to acknowledge them in your Report, and to comply with any terms stated in their licence agreements.

6.3. Citing your references

The purpose of referencing your work is to enable the reader to trace the sources that have influenced your ideas and work, both for fuller detail and for more detailed comparison.

All items referred to in your research must be included in a reference list and no items should be listed in the reference list which are not referred to in the Report (see Section 6.2m above). Dawson (2009: Section 8.5) has a useful discussion of alternative styles for listing and citation, and on the avoidance of plagiarism. The essential point here is that you must use a standard style and use it consistently. One approach is that this list should be in alphabetical order of author. For this reason, although reference information must be collected from the outset of any Project, it is the last thing to complete.

Less usually you may find that certain works have influenced your thinking a great deal but are not referred to in the text. These works may be listed in a separate Bibliography. Nevertheless it is very unusual for something to be important and not referred to directly.

Each Project Report must include a separate section for references. All sources should be referenced, including sales literature consulted and technical manuals, other projects and other work you may have done.

The general format for reference list entries is given below; see ISO690:2010 (2010) in Appendix A for more details.

Articles in journals or Serial publications	
Author	Give the surname first followed by initials or the full name if it adds to clarity. When there are two authors, both must be given. When there are three or more, the first name only is sufficient followed by 'and others'. When there are no authors, often the name of the issuing department (e.g. a government body) or a company can be given instead. A few things may need to be classified as anonymous.
Title	In full with only the initial letter and proper nouns in capitals. If the original is in a language other than English this should be identified or the title given in the original language.
Name of journal	There are internationally acceptable title abbreviations that may be used. Do not make up your own abbreviations.
Journal reference	Volume number, part or month, year, page range. The part number refers to the issue, so the February issue is Part 2 for a monthly publication. Unpublished works or private communications should be similarly referenced and their status indicated.

Examples

Hull M.E.C. and O' Donoghue P.G.O., 'Family relationships between requirements and design specification methods'. *Computer Journal*, **36**(2), pp.153–168 (1993).

Lee A.S., 'A scientific methodology for MIS case studies'. *MIS Quarterly*, **13**, pp.33–50 (1989).

Wiseman C. and MacMillan I.C., 'Creating competitive weapons from information systems'. *Journal of Business Strategy*, **5**(2), pp.42–49 (1982).

Books

Author	As for journals. However, if you are referencing a part of a publication you need first to give the author's name and title of the part concerned, then 'in ...' followed by the author(s), title of the whole work, and edition where appropriate.
Title	As for journals, but italicised rather than in quotation marks.
Publisher	The full name of the publisher and place of publication (usually the city); in America this can include the state.
Date of publication	The year.

Examples

Honeywell: *COBOL reference manual*, DD25, D8 D9, (Honeywell Information Systems: New York, 1975).

Microsoft, *Excel: Function Reference (AB26298-0392)*, 464, (Microsoft Corporation: Washington, 1992).

Naughton M., Wisdom C., Hall N.: *Viewdata – The Business Applications*, pp.91–93 (Communications Educational Services: London, 1986).

Taylor, T.: *Creativity in Evolution: Individuals, Interactions and Environments*, in Bentley, P. and Corne D.: *Creative Evolutionary Systems*, pp.79–108 (Morgan Kaufmann: San Francisco, 2001).

Electronic sources

Referencing these is covered by the standard ISO690:2010 (2010). Some examples are given below:

Examples

Beckleheimer, Jeff, 'How do you cite URLs in a bibliography?' 26 August 1994 <www.nrlssc.navy.mil/meta/bibliography/html> [cited 21/12/2004]

Arnzen, Michael A., 'Cyber citation: documenting internet sources presents some thorny problems', Internet World September 1996; 7(9) pp.72–74 <www.internetworld.com/1996/09/cybercitations.html> [cited 21/12/2004]

6.4. Referencing (citing) the reference list

There are several possible standards for referencing or citing the reference list. The important point is to be consistent, as if you vary or mix standards it will make identification of references more difficult for the reader, will

adversely affect your presentation (and marks for it) and make it harder for the Examiners to view your Report as a consistent, coherent piece of work. We recommend that you use the **Harvard** citation style (as used in this guide), where the author name(s) and publication year are used as identification – see Dawson (2009: Section 8.5.2).

If you need to refer to two sections of the same publication in the same report you need not repeat all the details in the reference list, just those details that are different, usually the page reference but possibly the volume number.

Remember you do not repeat previously published information merely to provide background material – the citation is sufficient. Short quotations of text are permitted **in quotation marks** if correctly cited (see Section 6.6). You should also acknowledge any use of diagrams, tables, etc. from other sources.

If you find you are summarising or paraphrasing other work you are heading for failure. Cut out this material and include the relevant citation only. Where you wish to make a comparison between alternative views or to make a critical judgement then you need to explain your sources. The distinction is that in the second case it is your views you are presenting, not just discussing and justifying those of someone else.

You will also find helpful the distinction between external references or citations, which are to previously published work, and internal references (that is, cross-references, see Section 6.5 below), which are to other parts of your work.

6.5. Referencing other parts of your Report

The term ‘cross-reference’ is defined as ‘a reference at one place in a work to information at another place in the same work’ (*WordNet Online*, 2010). The term was used above in Section 6.4. Stating that the term was mentioned in Section 6.4 is a cross-reference to that section, while the citation of the definition of the term includes a reference (to a text outside this guide). The statement ‘*WordNet Online* is listed in the References section of this guide’ is another example of a cross-reference.

When you produce your Report you should find that you are the expert in the detail of your work. To communicate successfully you will need to reference other parts of your Report. Use the section numbers in the Report to direct the reader and to reinforce connections in your work. Typical uses are:

- to direct the reader to further detail in Appendices
- to connect objectives, methods and results
- to direct the reader in discussion to the source of an issue where the material is in the results or Appendices
- in addition, to make a Report more concise by avoiding repetition of material already given elsewhere.

Think of these references as signposts. Use them to tell the reader where they are going, to remind the reader where they have been and to indicate interesting areas of detail not being fully considered in your text.

Correct use of cross-referencing helps to make a Report more cogent and coherent. Poor cross-referencing contributes to poor readability and poor presentation of material and, regrettably, is a common fault in undergraduate Project Reports.

6.6. Quoting, summarising, avoiding plagiarism

An area where many students are uncertain is in how to lay out quotations and how to avoid apparent plagiarism. As a simple example, reference is made to material in Section 1.2. of this guide.

You might write:

There are many ways to think of what a Project is for. One is as follows: The Project provides experience in carrying out original work to the standards required of an academic investigation. Another notion of its purpose is...

This is plagiarism as you have not distinguished your own text from the text you have copied and you have not referenced the copied text.

On the other hand, you could write:

There are many ways to think of what a Project is for. One is given in Taylor (2012: 5): *'The Project provides experience in carrying out original work to the standards required of an academic investigation.'* Another notion of its purpose is ...

... and in your Reference List, include the following:

Taylor T. 'CO3320 Project Subject Guide', University of London, 2012.

Now you have identified the exact text you are quoting and its source. This is good practice. The use of italics for quotes also helps to make it clear that the text is from another source.

Another area to be careful of is paraphrasing. If it is really relevant to paraphrase (rather than quoting or giving a reference) you might write:

... There are many ways to think of what a Project is for. Taylor (2012) writes of the provision of experience in pursuing work of academic standard and in executing original work as both being important. This is only the view of Taylor. The issue of depth of background reading is also significant. ...

This is sound practice.

One common fault is not to show where the paraphrase ends. For instance, if the sentence: 'This is only the view of Taylor' is omitted, then the reader has no clue as to where your ideas start and you may get no credit for them.

Also, a serious issue arises if the example above is replaced by a paraphrase without attribution, as in:

'... There are many ways to think of what a Project is for including the provision of experience in pursuing work of academic standard and in executing original work as both being important.. The issue of depth of background reading is also important. ...'

Now plagiarism becomes an issue as a close paraphrase has been given without acknowledging the source. For additional advice, see Dawson (2009: Section 8.5).

6.7. Common faults in Reports

This section records some of the common problems often found in Reports – the points have been mentioned before so this is a partial checklist.

	Symptom(s)	Solution(s)
Deliverables by magic	On opening a Report the immediate impression is of a large volume of code or analysis/design documentation with no idea of its source.	Explain the methods by which the work was produced; explain design decisions; include a road map to guide the reader.
Deliverables of unknown origin	The work seems to be of good quality but seems too extensive to have been done as a Project.	If work existed before the start of the Project, define what existed, its status and who was responsible for its production.
Deliverables of unknown quality	The work appears sound but there is no evidence of its validity.	Include test results (summarised), relevant reports of meetings, walk-throughs, inspections and workshops, with a commentary on their relevance.
Blind assertions of fact	The assertion of facts, often as a list (for example, the critical success factors are...).	Everything in your Report has either an external source or is a result of your work. Either way, ensure the source is clear. Only repeat an external source list if you intend to discuss every point.
Unsources diagrams	A diagram is supplied without a source.	Give the source. If you have adapted several sources make clear the contribution of each.
No source code	In the Report you describe software that you have developed during the Project, but the source code for the software is not included. The Examiners must be able to see any code that you have written.	Any source code that you write must be submitted with the Report, either as a listing in the Appendix, and/or electronically on media submitted with the Report. You should also include an executable version of your code. See Section 6.2.1.

7. Studying for the Project course

7.1 Studying alone for the Project course

Some caveats on studying alone have been given above. While unsupported self-study is certainly challenging, and great self-discipline is required, it is not impossible.

A very important task in self-study is self-criticism, or self-review. It is both simple to describe and difficult to do well. To illustrate the problem, consider how a supervisor can help in review.

A supervisor can sit back from the work in which the student is intensely involved and, relatively easily, see whether or not effort is being misdirected (for example, through too much time spent on an unimportant matter, or divergence from the correct direction of investigation), or whether deadlines are being met.

A self-study student must carry out this overview on their own, acting as their own supervisor. Therefore it is necessary to read and apply the advice in Section 10 of this guide. The self-study student must be capable of changing between detailed and overall views of the work at will. One strategy for this is to strictly set aside time at regular intervals (e.g. every two weeks) when all work on the Project topic is stopped for a short session. During this session the only things that are considered are review questions, including:

1. Have the targets for the work to be done – set at the last review session – been met?
2. Is the work that has been done relevant?
3. Do existing deadlines for the work to be done need to be reset?
4. If deadlines have slipped, is it necessary to allow extra time for incomplete and pending tasks?
5. Is there enough time to complete the programme of work set out?
6. Is all the remaining work to be done relevant in the light of the results so far?
7. If the answer to one or both of 5 and 6 is ‘no’, then how can the Project be re-scoped to enable completion, on time, of a coherent body of work that is relevant and valuable?

According to the answers to these questions:

1. Carry on with the existing Project and deadlines (if you have enough time and your results so far are satisfactory).
2. Stop any activity that is now known to be irrelevant or cannot yield useful results in time.
3. In the light of work done so far, replace vaguely specified goals with more precise ones and tighten up the precision of deadlines wherever possible.

If necessary to meet the completion deadline, slim down your scope and goals, keeping those that will give the most interesting results academically (rather than just the easiest results to achieve). Such re-scoping, by focusing on a part of the original Project, is not uncommon, for example, because some tasks turn out to be more time-consuming than expected. Re-scoping can be beneficial, for example because something narrow in scope but interesting, done well and in depth, is far more satisfactory than achieving a wide-ranging but ill-coordinated set of goals with only

superficial coverage. Such broad but lightweight work often degenerates into a long introductory description of an area, summarising readings from textbooks and other sources without going beyond them. Such work will gain low marks and may well fail. By contrast, an appropriately focused scope for a Project allows room for you to develop your own slant on the work, expressing a personal view that can be soundly argued by reference to relevant literature.

In the light of current goals, set tasks to be achieved by the next review session. **The essential point of all of the above is that you must take time to actively review your progress at regular intervals, and be prepared to revise your work plan in the light of your actual progress to date.**

7.2. Supervision at an institution

If you study at an institution, the initial discussions on topics and areas of interest will be conducted with designated academic staff. All Projects benefit from a member of staff as supervisor. Your supervisor is there to help you as needed, by offering guidance on conducting your Project and on writing your Final Report.

You should read Section 7.1 of this guide, as it contains advice on actively managing your Project that is relevant to all students, not just those who are studying alone.

It is your responsibility to consult your supervisor as you require, not the other way round. If you need help in some aspect of your work or advice on constructing your Report, consult your supervisor as soon as possible. You should keep your supervisor informed of your progress. Your supervisor, Project tutor or course leader will explain how this is to be done.

8. Administration

8.1. Presenting your work

One copy of both the PPR and the Final Project Report must be submitted to the University of London. **These will not be returned** – so keep a copy for your own reference. A good Project is something to highlight on your CV and show to potential employers or an admissions tutor for a higher degree that you wish to study. All Reports must be typed or word-processed. High-quality print from ink-jet or laser printers is preferred and adds much to the appearance of your work. The text should be single-spaced, and the printing may be either single- or double-sided.

Good presentation standards include sound English grammar, punctuation and spelling. Work will be assessed as unsatisfactory if standards of correct grammar and spelling are not met. Always write to your readership. Make sure that you use a spell checker.

8.2. Submission

8.2.1. The Preliminary Project Report (PPR)

All students are entirely responsible for submitting their PPR to the University of London via the Computing VLE, on or before the deadline in January of the year of the examination. The deadline is usually 15 January, but double check the Programme Regulations for the current session to see the date in force for the current year.

For the academic year 2012–13 onwards, **all PPRs must be submitted electronically via the Computing VLE**. You are **not** required to submit a hard-copy version of the PPR. Some weeks before the submission deadline, a link will appear on the Project course page of the VLE, which will enable you to upload your PPR. When you follow the link to upload your PPR, you will also be required to complete two other online forms:

1. A **Project Abstract Form**, on which you will be asked to provide your Project title, keywords to describe your Project, and a one-paragraph description of the Project's aims. The information provided on this form will be used by the University of London for the purpose of allocating Examiners for your Project.
2. A **Plagiarism Declaration Form**
 - When submitting your PPR, ensure that it conforms to the format described in Section 6.1.1.

8.2.2. The Final Project Report

All students are entirely responsible for submitting their Final Project Report to the University of London, and for ensuring that their work is sent to the University on or before the deadline in mid-May in the year of the examination. The deadline is usually 15 May, but double check the *Programme Regulations* for the current session to see the date in force for the current year. Note that the submission deadline is a 'sent by' deadline, meaning that the package must be postmarked no later than the specified date.

Your institution, if you are studying at one, may provide a service whereby it will send your Report to the University of London International Programmes on your behalf. **Although you may use these services, it will be at your own risk.**

- Your Project Report must be accompanied by a **Project submission form**. You must complete this form – and sign the declaration – and then attach it to the front of the Report. The form given at the end of this guide should either be photocopied or, if you prefer, you can produce your own typed or computer-generated version. If you choose to produce your own form, the format of the form as well as the content and wording must be exactly the same as that given.
- You **must** include an electronic version of your Project Report, in Portable Document Format (.pdf), on a CD-ROM, USB stick, or similar electronic medium, and submit it along with the hard-copy of your Report. If you are submitting code or other electronic files, these may be submitted on the same electronic medium (see Section 6.2.1 for further instructions).
- The University will **not** return your Project Report to you. **You must make a copy of your Project Report**. You will need this in case it is not received at the University of London International Programmes (a copy of the original may be asked for if the original goes astray). In addition, a good Project is something to put on your CV and to show potential employers.
- Before sending your Project Report to the University of London International Programmes, you must mark each page of your Report clearly with your name and student number. Number your pages consecutively and bind them securely together.
- When received by the University, your Project Report will be sent to two Examiners. It should be bound to withstand being passed around and read by both of the Examiners. As the Report will not be returned to you, we do not recommend that you pay for expensive binding beyond what is required to keep the Report intact for the purposes of marking.
- Pack your Project Report securely and send it by the most reliable means available, for example, courier, special delivery mail or registered post. No refund of costs can be made by the University. You are advised to send your Report by a method for which you can obtain not only proof of posting but also tracking and proof of receipt at the University of London International Programmes, to be used in the event of packages going astray.
- Packages should be marked clearly:
BSc <name of your programme>: Project Report
where <name of your programme> is
'Computing and Information Systems' or
'Creative Computing' as applicable.

The package should be addressed to:

Registration and Learning Resources Office
University of London International Programmes
Stewart House
32 Russell Square
London WC1B 5DN
United Kingdom

Questions on any matters concerning the submission of your Report should be made via the 'Ask a question area' of the Portal.

8.3. Assessment

8.3.1 The Preliminary Project Report (PPR)

The Examiners will be looking for clear evidence that you have made an effective start to your Project work, and that you understand what is needed to complete it.

The format of the PPR should be as set out in Section 6.1.1. The Project title given in the PPR should clearly indicate the specific topic of the Project, and not just some preliminary area of interest in which investigation has not begun. Note that it is understood that the title of the Final Project Report may well differ in the light of subsequent progress. The aims and objectives should be clearly stated. The Methods section should explain how you intend to achieve your objectives, and provide justification for your chosen methods with reference to what methods were employed in previous literature. The Project Plan should cover all aspects of work required to complete the Project, and be broken down to sub-tasks of duration generally no longer than two weeks each. As this is a plan it is understood that dates and activities may change. The Examiners are looking for evidence of thought in planning. The Progress to Date section should clearly show what specific progress has been made, and how this relates to your Project Plan.

8.3.2 The Final Project Report

This should follow the structure given in Section 6.2 although the Examiners accept that specific aspects of individual Projects may mean some variation enables a more coherent presentation. If there is any deviation from the structure in Section 6.2, this must be explained and justified in the Introduction to the Project Report. In any case the requirement stands for both context (through the literature survey, etc.) and contribution to be provided in relation to the challenge identified.

In addition to the general points made in Section 1.5 and the comments on marking criteria in Section 12, you can expect the following points to be highly significant in the assessment of your Project work.

Structure	Conformance to standards (Section 6 above).
Academic standards	Proper cross-referencing and Reference list.
Depth of knowledge	The extent of the work undertaken in the time permitted.
Originality of ideas	What you have to say that has not been said before.
Report quality	Good clear English. Appropriate use of diagrams and tables.

Section 11 discusses the Project examination and Section 12 discusses further aspects of assessment of the Project Report.

8.4. Plagiarism and illegality – a warning

Reading activity

See Section 6.3 above and, for example, Dawson (2009: Section 8.5), for advice on avoiding plagiarism when utilising the work of others.

The work you submit must be your own. Acknowledge any quotations you use from published or unpublished sources.

Do not copy the work of fellow students or Project Reports completed in previous years. Such unacknowledged quoting or copying (plagiarism) will constitute an examination offence and will be treated as cheating.

Also, deliberate damage to computer systems or to the work of others, or any misuse of computer systems or acts in contravention of normal legal and ethical requirements may lead to outright failure.

8.5. Oral presentation at an institution

If you are studying at an institution, then about half way through your Project study time a *viva* may be held. At this *viva* you will be expected to demonstrate your presentation skills to explain what your Project has achieved so far and what is planned. The audience is likely to consist of your supervisor and at least one other member of staff.

One main purpose of the *viva* is to allow you to explain and justify what you have achieved rather than to give a report of your activities.

Note that you will not have much time so it is essential to concentrate on the achievements of your Project. Do **not** try and present everything that you have done. You do not have the time. Do **not** spend much time on your methods – although if necessary, you can expect to be questioned on these.

You can then expect to be questioned closely on matters of academic interest related to your work. You should prepare for questions.

In particular, if your presentation involves a demonstration take great care to check everything (both hardware and software) well in advance of the presentation.

A second main benefit of an appropriately timed presentation is that, if significant problems with your work emerge under questioning, then you have time to correct them.

There is a more general discussion on presentations in Section 9 below.

Reading activity

Dawson (2009: Chapter 9) has some useful guidance on presentation, within which Section 9.2 has much to say on oral presentations.

9. Research methods, presentations and report writing

This section provides further supplementary information to help you carry out your Project work, to help you with the Project *viva* (required by some institutions as part of the course) and to help you present the Final Report.

Reading activity

All the topics covered can and should be explored in more depth through further reading, e.g. Chapters 8 and 9 of Dawson (2009), and elsewhere.

9.1. Interviews

Common interview-related faults in Project Reports

Failure to produce individual interview reports
Failure to interpret the interview content in the report
Failure to relate the content to the problem in hand
Failure to analyse interview reports as a group

Interviews are a type of meeting. A fact-finding interview allows one party or both to gain information, as well as elicit mutual confidence and trust. The first step in dealing with most business problems is to interview someone carefully about them. All interviews need to be documented and the interview reports with their subsequent analysis will form part of your Project Report (results).

Reading activity

In addition to the comments on interviews given below, see Dawson (2009: Section 2.4.3) for additional discussion and advice.

9.1.1. Listening

Interviews fail for two main reasons, one of which is not listening. Some fundamental reasons for this are listed below. Try to evaluate your own performance after interviews. When you discover problems, develop techniques to correct or avoid the situation in the future:

- What you are saying is more interesting than any possible response.
- You assume you know the answer already.
- You know the response will be too complex, irrelevant or totally familiar.
- You do not like the speaker.
- You do not like what the speaker is saying.
- You are distracted.
- Listening is inaction and therefore weak.

You get on much better when:

- You like the speaker, who has something to say.
- There are risks and rewards involved.
- You are desperate for the information.

Do not neglect **observation**. Facial expressions, gestures and body posture often say much about what a person really thinks, frequently communicating things that they would prefer to conceal.

Style of dress and tone of voice are also important. Good advice is to look and sound interested. Sit in the front part of the seat leaning slightly forward to show interest. Your own unconscious actions and reactions are great give-aways. Honesty is the best policy.

There is a special problem with the telephone interview where there are no non-verbal cues. You need to pay special attention to the tone of voice, hesitations and the unexpected – such as sudden changes of subject.

9.1.2. Relationships

The second major failure is in not establishing an adequate working relationship or rapport between the interviewer and interviewee. This is a very personal factor. You need to be yourself and use your own personality resources carefully to establish the correct balance.

Relationships are established quickly, and normally the first few moments of an interview are critical. Especially at a first meeting try consciously to get this right. Remember the interviewee has feelings too.

9.1.3. Interview context

The work environment may be a source of difficulties. There can be no general advice. Remember only to meet your brief, not someone else's. Be aware of the corporate culture and standards and adopt them yourself. Use the company jargon, not your own.

Always try and know something of the work of the person you are interviewing, and make sure that the questions you ask are relevant to the person to whom you are speaking. A senior manager may be excellent on matters of business policy but you would not expect them to know how orders are taken in great detail (and they may well not be prepared to admit it or they may not be aware of their own ignorance). In any case you will want to check things with the people doing the job.

Watch for signals. If something you have said seems to get an unexpected response it may be because you have inadvertently hit upon a sensitive subject. You should not feel that the details you pick up on the environment are wasted, even if they do not seem to relate directly to your problem. They will help you draft and present reports, help you determine the best ways of convincing people as well as alert you to possible training problems.

9.1.4. Interview organisation

There is a wide variation in the degree of formality that occurs. At one end of the scale you might just be hoping to bump into someone in the corridor – you then find excuses to walk along that corridor. However, normally a degree of formality is both a practical necessity (to actually get to see the people you need to see) and is also expected of you (both by the interviewee and whoever you have to report to).

- **Give notice** of the interview. Make an appointment either directly or through a secretary. Always do this carefully; you are not in a position to insist and this is your first contact. First impressions last. Where possible confirm the date, place and duration in writing and always agree these three points over the telephone.

- **Define and make known objectives.** Sometimes you may not want to go into detail until meeting but often you might want to stimulate some research or thought on the part of the interviewee. In any case you do need to make known and, to some extent, agree on the content of the interview. No one likes to meet a stranger completely out of context.
- **Confirm all agreements** made at the interview and confirm further action in your conclusion. If you look and act professionally, the chances are that your respondents will try and behave the same way.
- **Document all interviews carefully as soon as possible after completion.** If you need to take notes get the respondents' agreement, but try and keep notes to purely factual details. Interview reports are useful both to you and to those who come after you, and will form part of your Project Report. They also help keep track of where you got certain information. Use interview reports to record your own thoughts and ideas.
- **Open and close interviews carefully.** Both these acts condition responses to a disproportionate extent.
- **Opening** means that the first thing you say has to hit the right level; suitably confident, friendly or deferential, for example.
- **Closing** involves summarising the main points of **agreement** for further action and leaving the door open for further discussion in both directions. Do not overstay your welcome.
- **Do not prepare a long list of questions you must ask.** This leads to rigid interrogation of less and less relevance the longer it proceeds, and can sound like a verbal questionnaire. What you may find useful is a short list of topics that you think you want to explore. Prepare these carefully, and be prepared to cover them in a different order.

9.1.5. Barriers to communication

Language: English words mean different things to different people. The 500 most used English words average 28 meanings each. (Check with the *Oxford English Dictionary* if you doubt this!) Talking about different things using the same word is confusing.

As well as denotative problems, English words often have multiple and personal connotations. The use of wrongly chosen words develops emotional noise that distracts from the problem in hand.

Frame of reference: The lack of a frame of reference is a common difficulty as interviewer and interviewee frequently have little in common. Both parties need to know what is going on and each must be prepared to share with the other. Give some time to ensuring that you are talking about the same thing from known viewpoints.

Emotional situation: This can be very important. If an interviewee is emotionally upset or threatened, this will block more rational communication. What may seem trivial to you can be exactly the reverse to someone else. You can generate these emotions easily yourself if you are not careful.

Stereotyping: Hearing the expected is a frequent problem. We do not hear what people actually say. We perceive what they say in the light of our previous experience. We also ignore things that conflict with what we already know.

Credibility: Some people are believable and can, therefore, communicate. Others have very low credibility. This is one reason to be professional in your approach; after you have let someone down once they will not take you seriously again.

Group behaviour: Few people behave entirely as an individual – they act in groups. Your interview is likely to be discussed beyond the office walls. Do not worry about this: use it.

However, effective communication is not difficult; it is just that effective communication looks effortless. It is not.

9.1.6. Questioning

Watch carefully the kind of questions you use; again, each has their time and place. The wrong choice can be disastrous.

Open questions are those that encourage the interviewee to talk. Use open questions especially to open up a subject. Always give the interviewee plenty of chance to speak. Do not expect everyone to be articulate. Carefully keep the interviewee on the subject – but only when you are clear you know what the subject should be.

Reflective questions are those that rephrase the interviewee's words. They confirm your interest and attention and generally stimulate further information. Use reflective questions to keep a useful source talking. Formulate these questions as statements (you feel that..., so you wanted to...) that summarise and give emphasis.

Do not guess and reflect things that are unstated or press if reflection brings no response. It is usually a good idea to reflect the positive rather than the negative if this leads the discussion in the right direction.

Use silence. If there is a pause while the interviewee responds, do not jump in with another question. Give people enough time to sort out their thoughts. A difficult question requires time to answer. Take care; people may need to be rescued.

Use direct questions: but not too many and not until you know what you want to ask or until the respondent is in a position to understand the question and why you want to know.

Avoid leading questions: do not try and put words into someone's mouth; you are then heading for a directive approach and you will not gain much from the interview.

Avoid subjective judgements. Try and keep to the facts. Whatever happens do not run down other members of an organisation. You may have to interview them later.

Expect to be questioned yourself. The best advice is 'be honest'. If you do not know, say so; if you do know, say so. If you know but do not say, say so. Do not speculate on the unpredictable.

9.1.7. Interview precautions

- Never, ever take sides in any internal dispute.
- Do not make promises you cannot keep.
- Do not make promises you will not keep.

9.1.8. Interview content

This is clearly highly specific to the problem in hand. Remember that as you obtain information, you need to analyse and evaluate what you thought you knew before you asked the question. The basic questions are:

What?	Who?	When?
Where?	Why?	How?

Followed by:

How often?	How well?
How many?	How much?

9.2. Observation**Common observation-related faults in Project Reports**

Failure to produce individual observation reports
 Failure to research the formal techniques of observation
 Failure to define the observation context
 Failure to justify the observation method

Detailed observation is in general not a very effective way of obtaining the kind of information required for developing computer systems. Most obviously a new system is likely to change working practice and the details of the old working practices have limited value.

Other major drawbacks are the ease with which people can be antagonised if they are being watched (or even if they think they are) and the fact that behaviour changes if people are being observed (and not always for the better).

Observation is also very expensive on time. It is worth distinguishing observation from interviewing at the workplace, which can be very productive.

If you intend to use observation as a technique, care must be taken to document the activities carefully. You need to decide in advance the plan for observation, what you are observing, the method of recording observations and how the observations are to be analysed.

Informal observation (that is being observant) can be very valuable in getting the feel of a particular organisation and the way it is managed (look for piles of papers, frequent interruptions, bad time-keeping, etc., as well as the positive signs of a productive and efficient workplace). Be careful as such subjective information that can be both embarrassing and misleading out of context. Points to note include:

- interruption
- unexpected tasks
- use of files
- use of telephone
- use of email
- informal communications
- departmental relations

- workload
- operational problems.

Reading activity

For some further comments on observation techniques, see Dawson (2009: Section 2.4.5).

9.3. Questionnaire surveys

Main quality indicators

Clear, interesting objectives

Coherent survey methodology

Well explained questionnaire design linking result and objectives

Valid sampling technique

Main survey-related faults in Project Reports

No hypotheses to test in the survey

No use for the survey results

Lack of time to develop and complete a valid survey

Failure to understand survey methodology

Problem investigation frequently generates difficulties that can only be overcome by the use of survey techniques. In these cases it is essential that very great care be paid to the details and methodology of the survey. These matters all need to be reported and discussed in your Project Report.

9.3.1. Use of questionnaires

A questionnaire survey can produce useful data for a Project provided the necessary detailed work is done in advance. Typical areas where one might be used are:

Geography: Maybe the area under investigation involves branch offices in different parts of the world. You cannot visit them all, nor is it feasible to get the people you want to come to you. A questionnaire survey with telephone follow-up can be useful.

Population: Say there are 50 offices involved, even if they are close by, the actual time involved in travelling to them may preclude meetings. Again a questionnaire survey is indicated.

Verification: You have information from what seems like a typical area, but it needs confirmation generally.

Simple: The ground is well prepared but you need to get hold of some reliable and straightforward information.

Sample: You want to give everyone a chance to contribute but can live with the situation if people do not respond.

Participation: You need to extend the involvement of people with the development of the system.

Consultation: You would like to give everyone the chance to express their views.

Attitudes: Perhaps you want to find out people's views and attitudes on some problem (e.g. a system review).

9.3.2. Organising surveys

The planning and organisation of the survey are essential to its success.

Define your objectives

Decide what you need to know (and perhaps what you would like to know; this is not necessarily the same thing). Cut out the non-essential and think carefully to see if there are alternative sources which are perhaps more reliable or easier to find. The survey has defined overall objectives. Every question in a questionnaire should have a purpose that is evident in the analysis of results.

Define your target

Decide exactly who you need to complete your questionnaire, making certain that they either have the information or can get it.

Motivate the respondents

You need a careful analysis of what is feasible and a realistic consideration of the survey objectives, your image and other constraints. For Project work you will frequently have to do two things. One is to promise anonymity in the Final Report and the other to send a summary of your findings to the respondents. Take care or your questionnaire will go straight into the waste paper basket.

Check the data

Verify that the data collected will permit the analysis you require. This is especially important if statistical analysis is to be carried out on the returns. Many surveys have problems because when the results are analysed they are found not to produce the answers to the question that was intended to be asked.

Organise

Arrange how the survey is to be carried out, how replies are to be chased, queries to be dealt with when replies are to be sent back, etc. Especially in the case of a work-based Project (the kind of surveys you are likely to be engaged in) it will probably be a practical necessity to enlist the co-operation and support of management in the departments concerned.

Medium

Consider what medium will be most appropriate for your questionnaire. You could use a traditional paper-based form, a form sent by email, or a web based survey (some websites that allow you to set up free online surveys are listed in Appendix A). There are pros and cons to each type of medium.

Reading activity

For further discussion, see Section 2.4.4 of Dawson (2009).

Obtain consents and permissions

Clearly all should be aware of why the survey is to be done, and consent to participate, but also help in administering the survey on site can help greatly in ensuring complete and accurate information.

Pilot

No questionnaire is so simple that it will not benefit from pre-testing, preferably by someone totally unaware of your objectives. In the case of a large survey, a pilot study is essential. This is the time when the obvious but overlooked factor is discovered. A pre-test also gives an opportunity to check the analysis procedures:

- Do the questions get the expected response?
- Are the objectives fulfilled?
- Is further explanation necessary?
- Is it safe to proceed?

9.3.3. Questionnaire questions**Get information that is a matter of record**

Ask questions that have precise answers. The question ‘how many orders do you get in a typical week?’ is inferior to ‘how many orders did you get last week?’ If people do not know the answer they will guess, and everybody exaggerates the amount of work that they do. The idea here is that by asking a precise question the actual number will be given, rather than a guesstimate (i.e. you are looking for something that can be measured as against something that can be estimated).

One element in each question

It is nearly always bad practice to combine ideas in the same question. Not because you will not get answers but because the question will be varyingly interpreted and the answers will then be almost meaningless (and you may not even notice). ‘Do you pass on the order and make a journal entry?’ covers two distinct activities and should be treated as such.

Be specific

‘How much of your time did you spend on the telephone last week?’ is better than ‘What percentage of your time do you spend on the telephone?’ But neither is precise. It would be better to ask respondents to keep records for a defined week (or monitor the telephones?). General questions get general answers and therefore the facts you are after can easily be masked.

Structuring answers into a set of allowed responses is a means of forcing a decisive reply but with the drawback that the response may become biased.

Be clear

It is very difficult to make all questions equally easy for everyone to answer. The simpler the language the better, and certainly you should aim to use language of the same level as the respondent. Remember, the aim is to communicate, but you do not have the immediate feedback that you can rely on in an interview. Technical terms common to the organisation tend to be good (they have precise local meanings).

Avoid ambiguity

This is a major problem as it is difficult to word a question so that it means the same thing to everyone. Most of the advice in this section will help you to avoid ambiguity that would make your analysis meaningless.

Allow for uncertainty

The respondent should have the option of saying, ‘do not know’ or ‘perhaps’ or ‘sometimes’ and of giving further explanation. Further explanation frequently allows something overlooked to come to light.

Do not be personal

Rarely you may need to ask personal questions. Try to avoid them, but if you cannot, explain why you want the information and wait for the complaints to come in.

Make answers easy to give

Easier said than done, but if questions are difficult to answer it must be to some necessary purpose. And you cannot do this too often in the same questionnaire.

Do not ask leading questions

It is very easy to ask loaded questions such as ‘What are your problems with the order system?’ (again not a good question on several counts). Here you are implying that there are problems.

Do not ask critical questions

‘Is your supervisor effective?’ will not be answered honestly and will upset the supervisor.

9.3.4. Questionnaire design

Common faults and their consequences

Ambiguous questions – non-comparable answers

Leading questions – biased answers

Vague questions – vague answers

Reading activity

Dawson (2009: Section 2.4.4) gives some discussion on this topic and points to some further specialist reading.

Questionnaire design and use is not a simple matter. The medium you choose for your questionnaire (see Section 9.3.2) will also have some influence on its design. You should read around the topic, and discuss the matter with your supervisor if you have one. Some specific recommendations are given here.

It is almost always appropriate to prototype a questionnaire. That is, try out your designed questionnaire on a small sample of respondents, particularly those who are likely to give you honest feedback about any problems they detect, such as a repeated question or failure to ask a question that would have elicited extra information. Then you can enhance your questionnaire before you gather your data. The whole process of design, test and enhancement should be described in your Report.

Get the name, location, email and telephone extension of each respondent: it can be bad practice not to know who has returned your questionnaire and there is always the risk that Mickey Mouse will respond. This may not be possible if you need to collect sensitive information but as our main interest is the workplace this is rarely the case.

Always leave a space for the respondent's name, date and signature on the form. You can waste a lot of time trying to read an indecipherable signature in a box marked NAME.

Make very clear what the respondent needs to do, how the questionnaire is to be completed, and to whom it is to be returned. The respondent should also know why they are being asked to complete what may well be a difficult form involving considerable extra work. This is all part of how you organise the survey.

Where possible group questions, so that similar types of details appear together. Not only is this easier to complete but also should help in the analysis of results. For example, all personal details would normally be together, and responses to these questions may determine which questions need to be answered in other places.

It is one of the marks of quality in design that it is clear which question is to be answered, when and by whom. The underlying logic of questionnaires can get very complicated very quickly, and post-survey checking can in these cases become a major problem.

Where you have a series of questions to ask on related subjects it is normally good practice to ask the more general questions before the more specific. This is to avoid leading people into a pre-determined answer by asking a question that may produce a strong emotional reaction.

Always try and avoid asking the same question more than once, even if it is slightly differently worded. It may be convenient for you to separate the questionnaire into two parts but it could easily annoy the respondent. Include your contact details for any queries; for example, by putting your name, telephone number and email address on the form.

Lay out the questionnaire so that it is easy to read and follow. Use bold type, for example, to emphasise important points, and separate instructions from questions and explanations. Allow adequate room for lengthy answers (how often have you filled in forms where you have about one inch for a full address?).

Any areas reserved for your use as part of the analysis should be clearly marked. There are many more things you can do in terms of layout, using the facilities of a decent word processor.


Where you are using pre-coded answers it is often possible to arrange these in boxes that can be conveniently read for tabulation. The primary aim of design is to make it easy to get the information you want.

Remember though that in a form-filling world people's expectations are of a 'professional' image and recent experience shows people see boxes as a sign of professionalism.

When reporting questionnaire results it is often useful to be able to quote literal responses to back up or tone down the numerical analysis. Controlling impact in this way does mean that you need to allow space for suitable comments and that you allow the space (where appropriate) to capture the transient idea you need to ask at the right time.

9.3.5. Question responses

A great deal of thought needs to go into deciding how the respondent is going to answer. No one technique is right or wrong in general. The difficulty is setting an answer style that is appropriate to the respondent, does not pre-judge the answer and discovers what you want to know.

OPEN	give opinions, descriptions, unlimited space
	state using defined space, words entered in given box
	enter in box using given code
	specify on rating scale supplied
	tick, mark, underline
CLOSED	delete as appropriate

The essential difference is where and when information is coded, either by the respondent or by you when you have the answers. Open questions preserve detail but do not make for efficient analysis of returns. Mixing these forms is dubious, in any question give all allowed responses or none, and beware of the suggestive prompt. Alternatives in pre-coded questions should be mutually exclusive and cover the full range of possible responses.

9.3.6. Sampling problems

Sampling needs careful consideration when acquiring data from a large population. There are situations where results are needed to a known precision. People normally overestimate the work they do and are greatly influenced by their current problems.

In such instances where you need to know not only the mean but also maybe the best case and the worst case, choosing a good sample is absolutely vital.

There are two basic principles: one is to avoid bias in the sample, and the other is to ensure the necessary precision by taking a large enough number of answers from the right respondents.

In many situations, a 'random' sample is chosen to avoid bias but, where the population is small and clearly identified, a 100 per cent response may be obtained if sufficient trouble is taken.

Analysis of sample data will be required. There are some notes on this in Section 9.5.

9.4. Meetings

Common meeting-related faults in Project Reports

Failure to explain and justify meeting purpose

Failure to document meeting and ensuing actions

Failure to use meeting to obtain agreements

You should read this section for general insight, although much of it will only be directly applicable if you are carrying out Project work involving meetings in your place of work or in a formal context in another organisation.

Generally, anyone undertaking Project work in industry is likely to be faced with the 'business meeting'. A meeting can be said to occur whenever people are gathered together for a discussion. Effective communication is made by both writing and personal contact in meetings.

9.4.1. Reasons for meetings

- It is often impossible to decide on important questions in isolation. Written responses to questions often generate additional questions.
- In general, written statements are neither concise nor complete.
- People who respond to written requests are often not the ones doing the actual work.
- Working together implies a mutual commitment to understanding and problem solving. This is difficult to generate through letters, memos and questionnaires.

9.4.2. Guidelines

Establish	a good rapport by two-way communication. Being pleasant is not the same thing as achieving a good rapport.
Empathise	put yourself in the other person's seat.
Concentrate	on what is being said.
Organise	what is being said by recognising the major points being made.
Confirm	these are the major points.
Listen	to the implicit as well as to the explicit.
Eliminate	distractions.
Show	interest – ask questions and encourage.
Observe	for signs that engagement is lacking – wandering attention, not wanting to meet your eyes, fidgeting or nervousness.
Record	by making notes as soon as possible while the memory is still fresh; bring objectivity into the notes; remember the atmosphere of the meeting.

9.4.3. Purpose of Project-oriented meetings

- To become aware of the relevant problems.
- To interpret current information.
- To clarify areas of ambiguity and doubt.
- To agree or review aims and objectives.
- To enable feelings to be expressed.
- To report progress.
- To allocate and accept responsibilities.
- To make collective decisions.
- To be aware of and influence decisions.
- To distribute and communicate factual data.

9.4.4. Key elements of successful meetings

Formulate a clear and unambiguous purpose for holding the meeting. Ensure necessary (but ideally no more than sufficient) representation at the meeting, in particular with respect to the following:

- opinions
- competence
- decision-taking approval
- rights.

Plan with respect to:

- time and duration
- place and environment
- constitution and procedures
- agenda (see below)
- communication to members.

Conduct the meeting expertly, that is appoint a good chairman (see below). Record the proceedings as required (see below). Organise the preparation and distribution of reports and other relevant information. Give proper headings and introductory details. Specify items, and ensure they are:

- necessary individually
- no more than sufficient collectively
- properly titled or described
- in meaningful and/or logical sequence.

9.4.5. Chairmanship

It is said that it is '90 per cent up to the Chairman whether we get the right results'. Here are some 'do's and don'ts' for chairmanship:

- Stick to the agenda, but allow amendments to it where necessary.
- Control a speaker's relevance to the item, firmly but with flexibility.
- Don't favour or silence individuals on a subjective personal basis.
- Do control timing: aim to get through the agenda.
- Don't lecture or be boorish.
- Do expect civilised behaviour and show that you expect it.

9.4.6. Record of the meeting or minutes

Careful evaluation of what is required is essential. It is highly unlikely that verbatim records are necessary. An indication of the topics discussed, the extent of the discussion, the nature of the agreement reached (if any); these usually constitute a sufficient general record of the meeting. The detail should amount to clear statements as to:

- agreed recommendations
- intended actions and individual responsibilities
- decisions formulated
- deferments of any of the above.

9.4.7. The secretary

The Chairman controls the actual meeting. It is the secretary who ensures that the agenda is complete, and if necessary requests and distributes papers in time for relevant documentation to be read and digested by the members before the meeting (timing is important). If the meeting is a regular occurrence then the secretary will judge, on the response received, the approximate duration of the meeting.

A notice of the meeting is sent in time for members to ensure their presence or send apologies if necessary. A record of the meeting is kept, in addition to the notes in Section 9.4.6 above, including a list of those present and apologies received.

The secretary of a committee is a useful person to cultivate. It is the secretary who writes the final agenda and produces the formal record of

events, so it is useful to be able to check that your important business is high up on the agenda and also that any action you specifically want recorded is in the minutes.

9.5. Data analysis and hypothesis testing

Many Projects involve gathering data. This may be from one or more of a number of sources such as through questionnaires or experimental results from executing software with a range of test data. To make use of this data you will normally have to analyse it in some way. This will generally involve carrying out some appropriate sampling and hypothesis testing.

Analysing your data in order to extract useful information is not a trivial process. The Computing programmes are not designed to make you a competent statistician and the material in the first year Mathematics for Computing course, even if part of your programme, will not be sufficient to enable you to carry out statistical analysis to any degree of sophistication.

Reading activity

If you need to carry out statistical analysis of data, you are advised to spend some time reading a good introductory textbook. Two appropriate books are:

- *Business Statistics: Decision Making with Data*, R.A. Johnson, John Wiley and Sons, 1997
- *Empirical Methods for Artificial Intelligence*, P.R. Cohen, MIT Press, 1995.

Another book that may be helpful for a more general introduction to statistical methods is:

- *A Basic Course in Statistics*, G.M. Clarke and D. Cooke, John Wiley and Sons, 2004.

Additional suggestions for further reading can be found in Section 10.5 of Dawson (2009).

If you do not have much background education in statistics, first look for an introductory overview that is accessible and helps you get used to the terms and issues. Reading of some web sources may be helpful. For example there is a useful introduction to basic terminology for hypothesis testing at www.stats.gla.ac.uk/steps/glossary/hypothesis_testing.html.

Many other good sources are available and using material that you find accessible and comprehensible is the main issue.

A typical situation is that you will be trying to determine if there is a significant difference between two sets of results. For your Project you may need to determine what to measure and how to analyse the resulting data. This process will vary according to your investigation but an example may help towards a more general understanding.

Consider the case of a student who has written some educational software designed to teach a concept to children. Often this kind of Project is undertaken by school teachers who have an interest in improving learning for their pupils. Generally they have the advantage of being able to use classes in their work place (subject to permissions from the school authorities, parents and other bodies).

This may lead to an experimental design in which two parallel class groups can be used, one for experiment with the new facility and the other with some traditional education method. Data gathering can include pre-testing (before the concept is taught) and post-testing of the groups to measure gains in knowledge through each educational process. This may include measures of retention with later tests. The design of the tests themselves requires care but in any case can yield substantial quantities of raw data.

The basic data analysis will give figures representing mean increase (or decrease) in performance, which could be for a complex activity or some simple task with standardised measures such as reading age.

Generally there will be a difference in the results for the two groups, but the fundamental question arises whether the observed difference occurred by chance or as a result of the choice of method, or whether the results represent a real difference between the two educational approaches. A large difference in results (of two methods the same in their effect) might arise by chance, though the probability of such a large difference decreases as the sample size increases. Correspondingly, a difference that is apparently small may be significant if the sample (number of pupils) is large.

Statistical significance is related to the proportion of such experiments that would give at least the difference seen, but the degree of significance depends on a number of factors which a good significance test will take into account.

Usually the student hopes their software will 'win' in the sense of giving an improved result for the 'test' group compared to the traditional approach used with the 'control' group. Thus to provide a sound argued conclusion they must present clear evidence for their case, while accepting that a negative result (that their software is no better, or even worse) is valuable academically.

Research activity

For an example of such research from Princeton University, see BBC News – '*Making things hard to read "can boost learning"*' at <www.bbc.co.uk/news/world-11573666>.

To begin it is useful to understand the difference between a **null** and an **alternative** hypothesis.

In the case of the example, the null hypothesis, denoted H_0 , would be that there is no difference between the educational approaches.

An alternative hypothesis, H_1 , could be what the student might like to see, that their educational software performs better (say with 95 per cent likelihood) than the traditional approach.

The likelihood set as acceptable to reject H_0 would conform to common usage in the area, which relates to the level of consequence of a decision being wrongly made. For example, in a safety critical area, such as approving a new medicine, it may be better to reject it unless there is a very strong likelihood it will do no harm and there is good evidence it will give benefit. That is, any probability of harm will carry far greater weight than the same probability of benefit.

If we reject a null hypothesis, and conclude (H_1) that a new medicine is, say, as safe and is more effective than the old one, when actually it is more harmful, then this is a Type I error, potentially serious. In the case of the educational software, a decision that the software is better than

the alternative may lead to its being adopted. If this is actually a wrong decision (a Type I error) then the consequences may not be very harmful to the pupils, but there could be long-term undesirable results that are widespread if the software is adopted extensively. Thus caution may dictate only rejecting H_0 in the face of very strong evidence (that the difference could arise by chance only 1 per cent of the time, or 0.01 per cent of the time, or whatever satisfies requirements (perhaps regulatory)).

A Type II error is when H_0 is not rejected when it is actually false, say when the new educational software is actually better. It may be hard to assess the probability of this happening or the seriousness of the consequences. At least matters will be no worse than they were before, either for the educational or for the medical example, but an opportunity for improvement has been lost.

In terms of your own Project, your interest and research should lead you towards meaningful hypotheses. These will determine your choice and design of experiments to gain relevant data to which appropriate analysis can be applied. The level of confidence in your results (at 90 per cent, 95 per cent, 99 per cent or higher level) will be something for which you should offer sensible arguments.

The above offers a very brief sketch of some basic issues. If data analysis for hypothesis testing is required for you to produce a meaningful outcome to your Project it will be necessary to carry out some focused background reading.

9.6. Presentations

Common presentation faults

Not concentrating on the decisions to be made

Providing too much procedural detail

Not making issues relevant

Too much reliance on visual aids, too little on ideas and issues

This section is an expansion of the content of Section 8.5.

Reading activity

You should remind yourself of any other reading that you performed in conjunction with Section 8.5, such as Dawson (2009: Section 9.2).

Carrying out a presentation provides valuable practice for a common task in employment.

If studying at an institution, you should undertake at least one presentation during your Project work. If you are studying alone, find an honestly critical and knowledgeable friend or colleague to listen to a presentation you make of your work. If you make such a presentation about halfway through the period of your Project, you will have time to use any feedback to improve your work. Be open to feedback and act on it. All presentations should lead to a decision or change of behaviour. They are all of restricted time. For these reasons, presentations require all non-essential material to be eliminated, and the essential points made with great clarity and impact.

Much of the material below has direct applicability to a Project presentation. All of it is relevant to presentations in general terms.

9.6.1. Effective presentations

In a Project context your objectives are to convince the audience that your work is worthwhile, that your work is valid and that you are competent to do the work.

Convey ideas simply and clearly: Generally achieve maximum impact by reinforcing a spoken idea with a visual image. Explain why the point is important by making it relevant to your audience.

Know the subject matter well: You know more than you present and can call on this to deal with problems and questions that arise.

Match subject level and audience level: You can only be successful if you speak to the level of knowledge and interest of the audience.

Use technical aids to communication: To achieve impact use aids to help make your points. But do not use aids because they are there or because you think you should. Use them for a clear and known purpose, and the audience will keep watching you.

Present credibly: Be confident and convincing – you know more than the audience and you have the benefit until and unless you demonstrate otherwise.

Voice: Be audible and clear. Project your voice to a level suitable for the size of the audience and the room in which the presentation takes place.

Writing: Be legible and grammatical. Presentations are not useful for going through detail. If you need to discuss something complex, circulate the material and then point out the points of relevance. Concentrate on a few bullet points reinforced visually and orally.

9.6.2. Plan for problems

In face-to-face communication there are more subtle considerations. For example, how to:

- start.
- create and maintain audience interest and rapport
- overcome apathy, hostility, incredulity, etc.
- use notes
- convey enthusiasm and get involvement
- pace your delivery
- structure, sequence and develop your argument
- keep to a time limit
- finish.

Many of these are skills that develop through repeated practice.

9.6.3. Technical aids

Where there is an audience and the communication process has some degree of formality, technical aids have greatest relevance.

Audiences can vary widely according to: number, level, experience, intelligence, ability, event. The variation applies both within an audience and across audiences and the successful selection and use of technical aids demands great skill.

The range of available aids includes:

- PC/laptop projector
- Chalkboard and/or whiteboard
- Flip charts (floor, wall, table)
- Overhead projector (transparency sheet and roll)
- Display-board systems (felt, magnetic, peg, pocket, etc.)
- Handouts (notes, copies of aids, printed material, photos, etc.)
- Recorded tapes (sound, video, tape-and-slide)
- Film and video projectors (TV monitor, video-beam)
- Telecommunications (TV, radio, terminals, telephone)
- Demonstration equipment and models (software and hardware)

The evaluation of these aids is a complex task even if the variables of audience, objective and environment have been defined. In some cases the use of a visual aid can detract from the presentation.

9.6.4. Visual display of management information

You will often need to be a skilled designer of information display for use in presentation sessions. A list of the major alternatives follows:

- **Display of words, text, symbols.**
- **Tables:** show correspondences between information sets. Tables comprise columns and rows; a third dimension can be added by colouring or encircling. These can vary from the very simple: for example the 'before/after' or 'pros and cons': to the highly sophisticated and specialised as in decision tables.
- **Block diagrams:** can be used to display elements and their interrelationships such as sequences, flows, organisation logic and topology.
- **Statistical diagrams:** the main types are:
 - Curvilinear graphs – to illustrate general correspondence.
 - Picture charts – quantities displayed as pictures.
 - Pie charts – fractions of a whole displayed as circle sectors.
 - Venn diagrams – show the areas of common/exclusive interest in up to four groups.
 - Bar charts – quantities displayed as lengths or bars.
 - Histograms – quantities displayed as vertical bars.

When preparing graphs, the choices of unit and scale are important.

Colour can be used effectively but always check visibility; some colours are good for general symbols or shading but are difficult to read when projected.

Reading activity

Dawson (2009: Section 8.4) has some useful advice on data presentation that applies to both reports and live presentations.

9.6.5. Presentation environment

Where such factors are under your control, ensure a comfortable environment:

- Sound Insulation, acoustics, background noise (no telephone).
- Light Natural vs. artificial, dimming, blackout.
- Air Ventilation, air conditioning, cleanliness.
- Services Refreshments, toilets, fire escape, first aid, rest room.
- Heat Adjustability, humidity, temperature gradients.
- Equipment Power supply, visual and aural aids, furniture and fittings.
- Room size Accommodation, shape, decor, audience-presenter arrangements, access.

9.6.6. Presentation guidelines

- Select a meaningful title ‘Cash Flow Improvement Project’ not ‘PLAN 9’ or ‘CFIP’.
- Participate in the selection of people attending. Include those who need to know and those concerned with your work.
- Anticipate objections. Know who the key decision-makers are.
- Start and finish on time.
- Allow time for questions – approximately 25 per cent.
- Don’t use jargon or unfamiliar language.
- Rehearse your presentation including the use of any technical aids.
- Summarise.
- Develop a positive and enthusiastic attitude towards your presentation.

9.6.7. Presentation organisation

At the start of your presentation, announce the purpose, programme and timetable of your talk; introduce yourself (and any other speakers by name and purpose). State arrangements for questions – are you happy to take questions during your presentation, or would you prefer to answer questions only at the end of the session? There are pros and cons to both approaches, but the important point is that you should tell the audience at the start what the arrangement is.

Watch reactions continuously. As a presenter you need to stay aware of your audience and carry members with you. So pick up signals of boredom, doubt and inattention.

At the end of your presentation, be sure to summarise what you have presented.

9.7. Report writing

The production of your Final Report is, of course, a requirement of the Project. It is also possible that in undertaking the Project you will need to produce reports for others, including companies involved in your work. This section gives outline guidance.

Reading activity

You should read widely on this topic, for example in Dawson (2009: Chapter 8).

This section is about reports in general as well as about Project Reports. Do not confuse the general area of reporting with your Project Report. If you need to report to a company as well, you will find this guide section useful.

If your Project is work based and your employer wants a report, do not confuse this with the requirements of the Project Report. The former may be short and concentrate only on results and recommendations.

By contrast, the Project Report must be an academic work that includes detailed reporting and analysis of background reading and other material. This is used as a basis for justifying the approach taken in your own work. Such structure and content is important to make your Report of interest and value to other workers in the area. (The structure required of your Project Report is described in Section 6.2.)

Since your Report forms the major deliverable which will be judged by the Examiners, it is vital that you write it well, and so you should read widely for advice.

Reading activity

See Dawson (2009: Chapter 8).

Note that directions in this guide take precedence over advice you find elsewhere.

9.7.1. Nature of reports

Reports present data, ideas and information for a purpose:

- action: to aid decision-making using an analytical method
- reference: to keep readers informed.

For example, the primary purpose of your Project Report is to give a full account of what you have done so that the Examiners can assess the value of your work. Another purpose is to demonstrate your ability to manage a significant-sized piece of work in an area that may be of interest to a potential employer.

9.7.2. Introduction to report writing

Reports are often intended to persuade people into adopting a course of action and should be written with the reader in mind.

The subject matter must be treated honestly; all sources must be acknowledged, whether they are from interviews or from written or electronic sources.

The contents should be valid, true and complete. The writer will often know more about the subject than the intended readers. The writer has a responsibility to ensure that the report is objective; therefore both sides of an argument should be stated.

To avoid the appearance of personal bias, it is customary to adopt an impersonal style. This may reduce the impact of the Report, but compensation can be made by other aspects of style (e.g. short crisp statements or short paragraphs for emphasis).

Vagueness in important areas is not justifiable and will increase the likelihood of the report being rejected.

A report can be written at the instigation of the writer or, more likely, at the request or expectations of another person or body. The purpose of the Report should be clearly understood and stated at the start.

9.7.3. Structuring reports

The following notes give guidelines on how to prepare and produce a reasonably complex report.

9.7.4. Planning

- Why is it wanted?
- Who wants it?
- What is wanted?
- How will it be used?

Determine objectives. Formulate the problem. What experience has the recipient in the subject matter? What type of presentation will be most effective? Is it for information, for further discussion or for definite action? Is it a statement of fact or are recommendations, comments and conclusions called for?

Two important aspects of preparation are investigation and presentation.

9.7.5. Investigation

- Determine the lines of enquiry.
- Collect and familiarise yourself with the material.
- Construct an initial list of possible literature to be referenced.
- Select and organise information, data and ideas.
- Analyse information and ways of reaching conclusions.
- Think creatively: all the alternative solutions.
- Decide on the best solution.
- Elaborate on the solution and implementation.

Reasons for research are to provide information for immediate use or for statistics and analysis; to show what has already been done in the field and where your report fits in; to show how others' findings may relate to your own conclusions; to give an understanding of the background.

The initial working reference list will usually differ from the final one. You must evaluate, eliminate, expand and organise items, by reading and taking notes. These notes in turn must be analysed, interpreted and organised without losing the original sources. Any direct quotes must be properly cited in your notes.

The final reference list shows which sources were used and helps others, who may be using your Report for a different purpose from that originally intended, to investigate further.

Other sources may need to be acknowledged, such as previous reports, interviews, minutes, radio programmes etc.; and these should all be included with the Reference List at the end of the text, before or after the Appendices.

Advice on referencing and citation is given in Sections 6.3 and 6.4 of this guide. Choose a style of presentation and be consistent. The page

numbers are usually included. Within each category store the references in alphabetical sequence.

9.7.6. Presentation of a report

Determine the structure and form an outline using the following items as appropriate:

- Title
- Table of Contents
- Summary or Abstract
- Introduction
- Body of report
- Conclusions
- Recommendations
- References
- Appendices
- Index.

Sketch out the main topics to be covered – headings, sub-headings and jottings only. You must be familiar with the subject matter before writing starts for the report to be clear and concise. The structure will depend on the type, purpose and complexity of the report.

Use a brief and meaningful title. Finalise the title, date, table of contents and the summary after the initial draft has been written. The summary is a concise statement of the most important conclusions and recommendations. It may include a brief background and purpose and identify those for whom it is of interest. Often the summary or abstract can be deduced from the initial outline.

The introduction should include:

- purpose of writing the report
- terms of reference
- history and background of the problem involved
- scope of the report and any limitations
- writer's objective and method or approach used.

Planning the body of the report will involve the following considerations:

- **Design.** The reader should proceed from step to step with minimum effort. Each step – one main matter or thought – should form a paragraph. Leading paragraphs should be titled and numbered for ease of reference.
- **Data – figures and tables.** Only the bare essentials should be recorded in the main text. They should be placed so that they can be referred to from the relevant part of the text without turning the pages. Further details should be put in an Appendix at the end of the report with an appropriate cross-reference.
- **Discussion.** It should expand what has gone before and stress important points.
- **Conclusions.** These are an interpretation and evaluation of what has gone before. Recommendations (if appropriate) are best as short, numbered sentences. If several people or departments are to be involved then it should be clear which actions they would be expected to take.

- **References** to sources from which material has been drawn should be identified, giving full details.
- **Appendices.** These contain supplementary material needed to back-up the report but which may break up the continuity of the text. (e.g. tables, illustrations, diagrams, detailed calculations, code, etc.). Each Appendix **must** be referred to in the main body of the report. For the Final Project Report, if you have large amounts of data, survey results, etc., to be included as appendices, it is acceptable for a sample to be provided in a printed Appendix, with the remaining bulk on electronic media (e.g. a CD-ROM or USB stick) provided with the written report – but, just as with any other Appendix, you must refer to this in the main text of the report so that the reader knows it is there.

COMPOSE the main areas:

- Introduction
- Body of report
- Conclusions
- Recommendations.

Having planned the items shown above, compose the draft report. Write rapidly and continuously, concentrating on ideas rather than style. On reviewing the first draft avoid distracting the reader by excessive detail or faulty writing – avoid spelling mistakes and bad grammar!

COMPOSE the final draft:

- Title and date
- Table of contents
- Summary
- References
- Appendices.

EDIT the draft:

- Read aloud
- Criticise objectively
- Cut out superfluous phrases, sentences, sections
- Clarify ambiguities.

Read the draft aloud, to someone else if possible. Consider the report from the reader's point of view. Critical points will be:

- **Is each paragraph:** RELEVANT, ACCURATE, CLEAR, CONCISE?
- **Is the report:** CLEAR, COMPLETE, IMPARTIAL, ORDERED, ACCURATE, OBJECTIVE and CONCISE?
- Is the final structure balanced?
- Are any paragraphs contradictory?

10. The role of a supervisor

This section describes the role a supervisor can play in helping you complete your Project successfully. If you are self-studying and cannot find a suitable supervisor, it is still worth reading this section; set some time aside for regular self-reviews during your Project, and consider the various points discussed below.

A supervisor can be of great value in helping you carry out an effective Project. You must be very clear, however, that it is **not** the role of the supervisor to do the work for you or to write any part of the Report. Areas in which a supervisor may be of help include:

- advice on a Project area and its title
- advice on developing a plan of action for your work. This should include advice on setting deadlines for production of your main deliverables
- agreement on regular contact times with you; typically once a week but no less often than once every two weeks
- adherence to agreed meeting times. A meeting will, typically, require at least half an hour to enable useful work to be done
- advice on background reading sources
- organisation of a presentation to be made by you, typically to your supervisor and another member of academic staff at your institution. A suitable time for this is about half-way through the session – late enough for you to have significant results to report and early enough to allow corrective action if a significant problem emerges. One benefit of the process is practice for the kind of short presentations that you may have to make at work to non-specialist management. Note: following a presentation, your next meeting with your supervisor should include a detailed review of the presentation in terms of lessons learned from it
- critical reading of drafts of part or all of your Report. Provide your supervisor with draft material as you write it. Do not wait until you have written the whole draft before showing it to your supervisor. If there is a structural problem, major rewriting may be needed and there may not be enough time left for that by the time the first draft is complete.

Reading activity

Dawson (2009: Section 7.4) also discusses how you can best utilise your supervisor.

10.1. A draft plan for a meeting with your supervisor

The main aim of a meeting is to evaluate what has been done so far and use the result in planning for the future. Thus a list of activities may include:

- Review progress on work done since the last meeting, compared to that planned.
- Discuss the relevance of the work done and its value.
- Agree on any rescoping of the Project due to slippage of deadlines or unexpected results.
- Agree a date, time and place for the next meeting.
- Agree on work to be done by the next meeting.

- Keep a full record of the meeting, to add to the records of earlier meetings. This may be done electronically, to aid sharing between you and to enable use of material in other documents. For example, you may minute the meeting in an email sent after the meeting. In this case **agreed work to be done** at one meeting becomes the **work to be reviewed** at the next meeting, without having to be written out again – the progress on the work can be recorded as annotation.

10.2. Critical actions in dealing with your supervisor

In this list, each action is critical to the success of your Project in that failure to carry it out will significantly increase your chances of failure.

- Do what your supervisor says.
- Attend every meeting with your supervisor (**never** miss one).
- Always set a date for the next meeting with your supervisor before finishing the current meeting.
- At the end of a supervisor meeting, always have a written record of what you are to do before the next meeting.
- If you miss a meeting, or a meeting is cancelled, try to ensure a meeting is held within a week.
- Do the agreed work in time for the next meeting.
- If you disagree with any of the above, discuss with your supervisor.

10.3. Time management and regular attendance of meetings

When a supervisor meeting is due, you should **never miss it**. If you are having problems with your work, your supervisor may well be able to help you start making useful progress again. If you do not see your supervisor then, firstly, they cannot help you and, secondly, you are more likely to have continuing and worsening problems. **The worse your problem, the greater is the reason for seeing your supervisor as soon as possible.** Despite this advice, many students still procrastinate about seeing their supervisor or doing the agreed work. Some points to bear in mind are as follows:

- Manage your time effectively, for **all** of your courses and assignments, so that you don't feel you must miss a meeting with your supervisor because you have assignments that are due in. Plan in advance what work needs to be done and when, so that you can keep to your scheduled meetings and also hand in all assignments before the submission deadline. If you plan to complete your work and assignments **before** they are due, rather than on the deadline, then you leave yourself some leeway for things going wrong (as they often do!).
- If you find you cannot complete all of the work agreed at the last meeting, contact your supervisor immediately to discuss your schedule and reasons for the delay.
- If you are ill, contact your supervisor and arrange another meeting as soon as possible.

The essential point to remember is that your supervisor is there to help you – make use of them, and do not avoid them if things are not going according to plan.

11. The Project examination

To pass the Project course, you must satisfy the Examiners in the Preliminary and Final Project Reports, and in the unseen examination in the same year. The Examiners will have read or will have access to your Project Reports.

When you have completed the Report on your Project you will know a great deal about the topic you have studied. However, unless you have studied at an institution that asks you to make a presentation on your work, and especially if you are studying alone, it may be that you have not had to respond to any questions on your work.

The need to describe your work to others in limited time, and to answer unexpected questions about it, is likely to arise frequently in your career.

The unseen Project examination is an opportunity to demonstrate the thoroughness of your understanding of your Project material by answering questions on it.

The examination paper will not be individually set for each Project student and so the questions are generic in nature. Your answers, though, must be very specific to your own work in order to demonstrate a good grasp of it.

Questions will require mainly descriptive answers. This is a valuable opportunity to demonstrate your powers of expression and argument in extended written answers. Unless explicitly instructed otherwise, answers to questions should be in the form of structured essays. Thus, unless instructed to do so, do **not** respond to a question requiring a description with a set of bullet points or some similar note-like answer, as this will not earn many marks. However, bullet points are an acceptable way of listing for a part of an answer within a structured essay. Likewise, writing that is of poor legibility will receive few marks, not least because the meaning of illegible work cannot be ascertained.

Hence in this examination you will reap extra rewards from all the effort you have put into good descriptive writing in earlier assignments and examinations.

The Examiners will give much credit for well-structured, concise, legible writing because of its importance for any graduate in this subject area. The Examiners will also be looking for how well your answers relate to your Report. Thus it is appropriate to include wording such as:

‘There is further detail on this topic in Section 3.2 of my Report’.

However, make sure you answer the question properly – **just** giving a reference to a section of your Report, where material relating to the examination question can be found, will gain no credit.

While the Examiners will expect you to have detailed knowledge of your Report and be able to refer to it, they will not expect you to remember every point of the technical detail, such as the contents of large tables of data. Thus, if discussing quantitative results, you would be expected to recall the main features of your data, especially in terms of the main results implied by them. However, having commented upon the main features in whatever way you are asked, it may be appropriate to add a remark such as:

‘The full data, with the exact minimum and maximum values for the range, are given in the second table in Chapter 5.’

(Obviously only if the comment makes sense in terms of the particular

examination question.) Of course, the more detail that you can remember the better, as long as such detail is relevant in answering the question.

As in any examination, it is worthwhile spending time first reading through the whole examination paper. Also read each question more carefully, before beginning an answer, to check that you fully understand what is wanted. Then plan the structure of your answer before beginning to write it. Last but not least it is generally most effective in gaining marks if you divide your time uniformly between questions – a perfect answer to one question alone will not gain enough marks for a pass.

11.1. Sample examination questions and advice on answers

The requirement from 2012–13 will be to answer four questions out of four for full marks in 2¼ hours. You will **not** be allowed to take a copy of your Report, or any other written material, into the examination hall. No calculators will be permitted, as they will not be needed.

1. **For up to five of the references quoted in your Report, outline the main points made in each that relate to your own work.** (10)

Explain how the results of your own work relate to these points and what you have done to extend the work reported in the references. (15)

Answer guideline

General note: All items in the reference list should be referenced from the text and there should be no quoting or paraphrasing from any work that is not in the reference list. There should be an extensive reference list, and literature survey, that puts the work reported in the Report into an academic context.

According to the nature of the Project, some particular references will be more important than others. For example, if contrasting and comparing two or more approaches to Object Oriented Analysis and Design, the relevant references will be those of the main proponents of each of the main methods, as well as major existing comparative studies.

What the Examiners will be looking for is a clear understanding of the range of influences on your work. Thus you should not use five references that all make the same point, but rather references that each make a distinct contribution. These references obviously must relate to what you actually achieved, given the question asked.

2. **Describe the main achievements of your Project as presented in your Report and explain how they represent an addition to knowledge in the subject area.** (25)

Answer guideline

What the Examiners are looking for here is for you to show a clear understanding of what you have achieved – beyond the contents of your background reading – and its relevance to your field of study. This will test your understanding of the background of the subject and what is known. If you do not include core references in your reference list and discuss them it shows lack of depth of reading, but far worse would be to claim as your own, results that are taken from those missing references. Thus you must be very clear about what you are claiming as your own results and it would be advantageous to explain how your background reading led you to the results you obtained.

3. Did your achievements in the Project, as reported in your Report, differ from the objectives set out in your Project proposal?

If yes:

a. State which objectives were not realised, and briefly describe any achievements that were additional to the original objectives. (15)

b. Discuss why these differences arose. (10)

If no:

a. Describe how the original Project proposal was drawn up and the procedures used to set deadlines for your deliverables. (15)

b. Identify any objectives that took more time, and any that took less time, than planned. Explain why the differences arose and how you resolved difficulties with items that exceeded the planned time. (10)

Answer guideline

Essentially you will be giving a different slant on the discussion that is in your Report, and in particular the material from the section on self-evaluation.

4. Describe the main procedures and tools that you used in your Project. (10)

Examples include questionnaires (including how these were designed) in the case of an investigation (user satisfaction, concerns over security in a proposed system, etc.) and software development environment in the case of system implementation (e.g. expert system shell, etc.)

Explain why you used them, naming some alternatives and giving reasons for their rejection. (10)

Give an assessment of the impact of the procedures and tools that you did use on the degree of success of your Project. (5)

Answer guideline

What is sought here is a description of the tools and techniques you used, together with a justification for their choice over the alternatives that you considered, and an evaluation of their usefulness.

12. Assessment of the Final Project Report

There are some short notes on qualitative aspects of assessment in Section 8.3. The purpose of this section is to give more detailed guidance on the criteria used in evaluation of the Final Project Report.

You should carry out some relevant background reading here – the more the better. For example, see Dawson (2009: Chapter 8) for information on structuring and writing your Report, data presentation, referencing, documenting software, etc.

12.1. The marking process

In 2011–12, the way in which the Final Project Report is marked was changed somewhat from the approach used previously. The motivation for this change is that it is a more flexible approach, and allows for a more varied range of work to be viewed positively.

All Project Reports are marked by two Examiners. The first Examiner writes a report on the Project, after reading it and examining any attached code or other supporting material submitted by the student. This Examiner also completes a mark sheet for the Project, which includes a list of criteria as shown below (Section 12.1.1).

Note that these criteria do not have specific marks assigned to them, and their relative weighting will depend on the focus of your particular Project. So, for example, if you end up doing a Project that has no code (for a valid reason, rather than that you ran out of time), then criterion K will be ‘not applicable’ and will not be used to decide on the grading. The basic criteria are expected of every Project.

You will not get a mark out of five for each of the criteria; instead you will get a rating of whether your Project Report is excellent, good, average, adequate or inadequate in that criterion. Putting all the criteria together gives the Examiner an overall picture of the strengths and weaknesses of your Project.

A grade will be assigned, based on how the criteria are evaluated. The grading scales are given in the table following the mark sheet below. From the chosen grade, a mark is then allocated.

The second Examiner uses the criteria, the report written by the first Examiner, and your Report, to decide whether or not they agree with the first Examiner. If there is a difference of more than 5 per cent, then the Examiners discuss to come to an agreement. If they are unable to agree, the Chief Examiner is consulted.

12.1.1. Criteria used to rate the Report

For each of the criteria shown below, the Examiners are asked to rate the Project according to the following scale:

0: not applicable, 1: inadequate, 2: adequate, 3: average, 4: good, 5: excellent

(In the ‘Weight’ column, the Examiner can indicate if a particular criterion is especially relevant when rating the overall quality of the specific Project being marked, given the nature of the Project.)

As explained above, the Examiner considers the overall distribution of ratings for each criterion to come to a decision on the final mark, according to the grading scale shown below.

Basic criteria	0	1	2	3	4	5	Weight
A. Understanding of the problem/area	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B. Completion of the Project	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
C. Quality of the work	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
D. Quality of the report	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
E. Citation and referencing: academic soundness	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Additional criteria	0	1	2	3	4	5	Weight
F. Knowledge of the literature	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
G. Critical evaluation of previous work	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
H. Justification of any design decisions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I. Solution of any conceptual problems	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
J. Amount of work (effort)/difficulty of the Project	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
K. Quality of code	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
L. Quality of discussion	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
M. Readability, use of visuals, tables	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Exceptional criteria	0	1	2	3	4	5	Weight
N. Evidence of originality	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
O. Contains publishable material?	Yes / No						<input type="checkbox"/>

12.1.2. Grading scales used for marking the Report

The following grading scale is used when assigning an overall mark to the Project Report. For an explanation of the level required to achieve each grade, refer to the *Programme Regulations* (Appendix E – Assessment criteria).

Grade point	Letter grade	Range (%)
High 1st	A+	90–100
1st	A	80–89
Low 1st	A-	70–79
High 2.1	B+	67–69
2.1	B	63–66
Low 2.1	B-	60–62
High 2.2	C+	57–59
2.2	C	53–56
Low 2.2	C-	50–52
High 3rd	D+	47–49
3rd	D	43–46
Low 3rd	D-	40–42
Pass	E	38–39
Weak Pass	E-	35–37
Fail	F	5–34

References

If you cannot find the exact versions of the books listed below, older or newer editions should also be suitable.

Essential reading

Dawson, C.W. *Projects in Computing and Information Systems: A Student's Guide*. (Harlow: Addison Wesley, 2009) second edition [ISBN 9780273721314].

Supplementary reading

Cornford, T. and S. Smithson *Project Research in Information Systems: A Student's Guide*. (Basingstoke: Palgrave Macmillan, 2005) second edition [ISBN 9781403934710].

Raimond, P. *Management Projects: Design, Research and Presentation*. (London: Chapman and Hall, 1993) [ISBN 9780412468100].

Rogerson, S. *Project Skills Handbook*. (Bromley: Chartwell-Bratt, 1989) [ISBN 9780862381462].

Data analysis

Clarke, G.M. and D. Cooke *A Basic Course in Statistics*. (Chichester: Wiley, 2004) expanded and revised (fifth) edition [ISBN 9780340814063].

Cohen, P.R. *Empirical Methods for Artificial Intelligence*. (Cambridge, MA: MIT Press/Bradford Books, 1995) [ISBN 9780262032254].

Johnson, R.A. and D.W. Wichern *Business Statistics: Decision Making with Data*. (New York: John Wiley, 1997) [ISBN 9780471592136].

General reference

ISO690:2010 (2010) 'Information and documentation – Guidelines for bibliographic references and citations to information resources' <www.iso.org/iso/catalogue_detail.htm?csnumber=43320> [cited 16/5/2012].

WordNet Online (version 3.1) (Princeton University, 2010) <wordnetweb.princeton.edu/perl/webwn> [cited 16/5/2012].

Appendix A: Additional resources

- **Books** for further reading: Dawson (2009) and other suggestions detailed in the Reference List (p.75).
- A number of useful resources are available on the CO3320 course page of the **Computing VLE** (which you can access via the University of London Student Portal <<http://my.londoninternational.ac.uk>>). These include:
 - **Examiners' reports** from previous years' Project Reports and examinations: each year the Examiners write a report after marking all of the Projects, describing what students did well, and what they had problems with, in that year's Project submissions.
 - **Project Library**: we have recently started building a library of good Projects from previous years, which includes links to electronic versions of the Project Reports. Each year we will add more Projects to this library to build up a bigger resource.
 - **Presentation on Projects and Research Skills**: a presentation prepared by the Course Directors in 2011 (some parts of this will be out of date, but most of it is general advice which is still applicable).
- **Online Library**: All University of London International Programmes students have use of the Online Library, where you can access electronic journals, ebooks and other academic literature. The library can be found at <<http://external.shl.lon.ac.uk/res/subjects/index.php?group=cis>>, and you will also find a link to it on the home page of the Computing VLE.
- **Google Scholar** <<http://scholar.google.com/>>: A useful online tool for searching for academic literature. The search results often include a link to an electronic version of the article. The results also include a list of which other papers have cited the article; this can be a useful tool for finding other, related (and more recent) literature.
- **Free tools for conducting online surveys**: A number of organisations provide free online tools which enable you to compose and conduct your own questionnaires and surveys, and analyse the results. These include:
 - **Survey Monkey** <www.surveymonkey.com>.
 - **Google Forms** <<http://drive.google.com>>: This is a component of Google Docs / Google Drive. An introduction is available at <www.google.com/google-d-s/forms/>.

Appendix B: Examples of Project titles

Most of the examples in the following list are titles of real Projects; some titles have been amended to improve clarity. Their inclusion is to give an idea of style rather than to indicate appropriate subject matter. There is no attempt to indicate the full variety of themes.

Notice the style of the titles. The first part often gives a general context; the second establishes the work done within a limited area. This list is provided only to give you an idea of some of the Projects that have been done. Do not restrict yourself to the topics listed here – a huge range of other topics would also make excellent Projects, as long as they adhere to the advice given throughout this guide.

Computing and Information Systems

- Problems of implementing web access to an operational database: a study of critical failure points in providing full transactional access.
- Office automation security at a petroleum company: how to implement critical services in an environment of available technology.
- Relating financial policy and management reporting at a computer company: solving IT problems of accounting periods by improving management understanding of their own information requirements.
- Survey of the use of optical storage in customer service departments at a major bank: the real benefits of massive on-line storage associating organisational change and competitiveness.
- C.A.S.E. tool integration practice: where C.A.S.E. tools hinder rapid development and what can be done about it.
- Software risk management practice: a survey of the techniques used by five successful developers.
- Survey of formal methods usage in the financial sector: an application of a formal method to a case study demonstrating proof of correctness at each refinement step.
- Algorithms for random number generation and their experimental evaluation: specifying requirements for pseudo-random numbers and evaluating the outcomes of implementation.
- A demonstration of techniques for the visual display of graph manipulation routines: an evaluation of the effectiveness of the selected graphical display techniques.
- An empirical evaluation of software complexity measures: can similar metrics be used with different source languages?
- Approaching the limits of data compression: the trade-off between performance and degree of compression.
- Intelligent assistance for decryption: the development of interactive software tools to aid the decryption process.
- The animation of selected sort algorithms: designing interactive visual processes to aid learning.
- The use of functional programming languages: how database technology can be used.
- An investigation into computer vision: how high and low level vision can be integrated.

- The graphical representation of robot blocks world: a demonstrator using MacProlog and a theorem prover to implement plans of arbitrary complexity.
- An investigation of the use of search in artificial intelligence: criteria for developing search strategies demonstrated in LISP.
- Defining service levels for electronic commerce: how to avoid offering a service that cannot be achieved.
- The role of the webmaster: accuracy, integrity, and flexibility and how they relate to consumer behaviour.
- Quality assurance in rapid development: evaluating the structures and measuring resources required.
- Managing security in a large SQL database: an analysis of security incidents over a six month period.
- Data mining: how users learn to ask the right questions.
- Multimedia courseware development: a study into the deficiencies of conventional courseware development methodologies.

Creative Computing

- Singular polyphonic music event transcription: fundamental frequency extraction through neural networks and DSP algorithms.
- Handsome Furs live in Chiang Mai: the influence of new technology and documentary styles on film making and editing.
- Programming language support for visual creativity: a comparison of Processing with standard Java in terms of simulating three-dimensional artefacts.
- Algorithms and creativity in music: AI issues in implementing and testing criteria for aesthetic judgements on computer-generated sound works.
- Digital technology: modelling partner work in animation.
- Digital technology and creativity: the use of collaborative design.
- Dance and technology: the use of Processing as a choreographer's aid.

UNIVERSITY OF LONDON

BSC IN COMPUTING AND RELATED SUBJECTS
FOR INTERNATIONAL PROGRAMMES STUDENTS

CO3320 PROJECT SUBMISSION FORM

A copy of this form (or a typed or computer generated version) must be completed by each student and attached to each project report that is submitted to the University.

The deadline for submitting your report to the University is usually **15 May** in the year of the examination (but double check the Programme Regulations for the current session to see the date in force for the current year). This is a 'sent by' deadline, meaning that the package must bear clear evidence (for example, a postmark or courier documentation) that it was sent no later than this date.

Full name:

Student number:.....

Project title:

DECLARATION

I declare that:

- I understand what is meant by plagiarism.
- I understand the implications of plagiarism.
- This project report is all my own work and I have acknowledged any use of published or unpublished works of other people.

Signature: **Date:**

Please send to: Registration and Learning Resources Office
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United Kingdom

Notes