Computing

Managing Your Advanced Higher Computing Project

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HIGHER STILL

Computing

Managing Your Advanced Higher Computing Project

Support Materials

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INTRODUCTION FOR STAFF

This pack has been designed to provide advice to the student over the sixty hours that he/she will spend on their project.

The project is the most extensive and challenging piece of work that students have to do so far within a Computing course. It demands of students a number of higher order skills including problem analysis, synthesis, time management and self-evaluation, in a situation in which they are often working on their own.

The project also differs significantly from that within the CSYS course and, because it is a mandatory unit of the Advanced Higher course, aspects of it may be assessed within the external examination.

For these reasons, students should read these support materials carefully and refer to them frequently as their project progresses.

The booklet guides students through the processes of selecting a project problem and using an analytical approach to develop a solution to it. The booklet also indicates clearly what evidence must be created and retained in order to demonstrate achievement of the 3 unit outcomes.

Staff should also refer to the published NAB from SQA (Computing Project D098 13/NAB001) which includes an exemplar project.

The exemplar project gives an indication of the depth of treatment required to meet the standard for Advanced Higher. It is perhaps worth mentioning that, while projects based like the exemplar on web page design are popular with students, the relevant software is increasingly transparent to use and it is critical that such projects demonstrate an appropriate Advanced Higher standard through, say, the complexity of the problem, the use of sophisticated peripheral devices or the level of communication with external agencies.

MANAGING YOUR ADVANCED HIGHER COMPUTING PROJECT

Planning your project

Since the Advanced Higher project is a substantial piece of work extending over several months, it is very important that you take seriously the need for careful planning. The 60 hours of the course allocated to the project is a very long time and, unless you plan how you are going to use this time, you can just drift along towards a completion date with an intention of 'working harder' towards the end to get the project done on time. Be careful - **'If you fail to plan, you are planning to fail'**.

Planning is not a once-and-for-all activity. The plan that you produce now will need amending as you progress through the project. You may complete some tasks ahead of schedule while others may take longer than expected. There will, however, be critical points at which certain tasks should be completed before you move on, and any delay at these points can threaten your project. Make sure you identify these critical points. Another reason for planning is that it will give you and your teacher/lecturer a way of measuring how your project is progressing.

The purposes of planning are:

- to give you a clear idea of the objectives
- to think about the various tasks and the order in which they should be tackled
- to produce estimates of times at which various critical points will be reached which can be used to measure your progress
- to make the best use of resources.

Selecting a project

The project is not just about 'finding out'; it is about 'solving a problem' where the solution will involve you using a computer. The topic *Computer Security* could be considered for an Advanced Higher project but you would need to specify a problem situation to be resolved. For example, you might examine a particular network installation from a security point of view. After considering alternative strategies for tackling network security, you might implement, test and evaluate security measures that cover system management and particular software and hardware protection schemes.

It is highly unlikely that you will come up with your choice of project straight away. Instead, you should consider several ideas, before finding the best problem for your project. You will need to be sure it suits your interests and skills and meets the requirements of an Advanced Higher project. It is also important that your project has some potential in terms of its value (is this worth doing?) and in the opportunity it gives for you to extend your knowledge beyond Advanced Higher. You are more likely to be motivated by spending your time on a project of some significance.

Project ideas may come from

- other topics in the Advanced Higher course
- articles in magazines and journals
- books and book reviews
- personal contacts in business
- your personal interest in computing.

If your project idea comes from, and extends, one or more of the Advanced Higher units then there is a good chance that it will be at the right standard. Waiting until you have studied these units, however, may delay the start of your project. If this is the case, you should note that you may be under some pressure from work in the latter part of the academic year and you will need to make allowances for this.

Here are three questions that might be helpful in directing you towards the selection of a project

1. **What area of computing am I really interested in?**
   It is very important that your project comes from an area that interests you since you will be spending a long time working on it. Follow up various ideas until you feel confident that you have an idea for a project that really motivates you.

2. **What computing problem am I trying to solve?**
   To satisfy the requirements for the project you need to identify a problem for which you can design and implement a solution.

   For example, you may come up with the idea *'Investigate the computer use in a local small business'*. The way that it is stated here, it is too vague and insufficiently complex for a project at Advanced Higher. However, there may be a specific problem within this business that lends itself to a software solution. After detailed analysis of the requirements, the design, implementation and testing of the solution could make an Advanced Higher project. Alternatively, you may decide to tackle a project in which you specify the system requirements for the local business, pilot alternative hardware and software, and then measure performance against pre-determined criteria in order to justify to the business manager your recommendation of a particular solution.

3. **Is this project feasible?**
   There are several factors that will influence the feasibility of a potential project. These are:
   (a) the availability of information and resources.
   For a particular project, make sure that you can gain access to essential information and that your school/college has the resources you need.

   (b) the acquisition of new skills.
   Although it is perfectly reasonable to expect Advanced Higher candidates to research new topics or acquire new skills for a project, it is unrealistic to expect them to be able to reach a high level of expertise in a short period of time. For example, if you know nothing at this stage about the programming language C, it would take you too long to reach the degree of competence in C that you need to implement all, or part of, a software design of sufficient complexity to meet the standard of Advanced Higher

   (c) the time needed to complete the project.
   Even with 60 hours for the project, it is still possible to run out of time. This might be because of a delay in obtaining essential information or because you need to share resources. You need to estimate the time for each stage in the development of your project and make sure that it can be done in 60 hours.

Assessment of the project

Before going any further, we need to look at how the project is going to be assessed. There is no point in spending a long time working on a project if you are not producing the correct evidence for the assessment of your project.

You have to pass 3 outcomes in the unit 'Computing Project'. The 3 outcomes are:

Outcome 1 Demonstrate an analytical approach to a computing problem.
Outcome 2 Demonstrate knowledge and understanding of relevant computing concepts.
Outcome 3 Implement a solution to a problem.

You may not immediately understand the phrase *analytical approach*. It is one of a number of ways to solve problems. It is the one chosen for the unit: **Computing Project**. Although it is only referred to specifically in Outcome 1, it is actually embedded in all 3 outcomes of the unit. It also provides the framework for assessing your project.

The analytical approach is made up of the following stages:

- Identify the problem: The Advanced Higher project must be based on a problem or situation that needs resolved. Your project must provide sufficient scope to include **all** the stages of the analytical approach.

- Define the boundaries of the problem: You must describe clearly the context of the problem and set the limits in terms of what is to be tackled and what is not. In setting such limits you will not only specify the extent of your project but you will also provide a means of measuring its success at a later stage. It is generally recognised that the more clearly and tightly defined a project, the better it is. Be wary of wide-ranging, 'woolly' projects; it is much more difficult to give depth and focus to them.

- State the requirements, etc: What will your solution be required to provide? What is it supposed to do? Provide hardware or software to resolve a problem? Clarify and elaborate issues in a problem area?

- Consider possible strategies: You should not just pick on one strategy to solving the problem even if there is an obvious one. Explore other possible strategies as this will help you to make your final choice and to justify your selection.

- Select a strategy: Eventually you will come to this stage when you choose what you consider to be the best strategy. You must write down the reasons for selecting this particular strategy.

- Design a solution: Now it is time to plan the detail of your strategy. A top-down method of design, drawing on what you have learned at Higher might be appropriate.

- Implement the solution: Your implementation should match your design as detailed in the previous section. Any modifications to the original design that become necessary should be logged in detail.

- Test the solution: Your solution will need to be well tested and tested in a logical manner. Again, remember what you learned at Higher about testing solutions, particularly at the logical extremities.

Whatever your project, you have to show that you have gone through these stages. That means you must write down your work and thoughts at each stage in a format that will bring your project credit. This is the evidence that your teacher/lecturer and others will use to assess your project. It does not mean that you need to create one long, continuous project report; it simply means that you keep a clear record of what you are doing and thinking at each stage. Do not leave it up to your teacher/lecturer to read between the lines or make assumptions about your work because you have not recorded your progress clearly. Your teacher/lecturer can only give you marks when there is actual evidence to justify those marks.

The analytical approach in the unit outcomes

Now let's look at how the stages of this analytical approach tie in with the 3 outcomes of the unit. The marking scheme which is used to assess your project is based on these outcomes and it is important that you know what you have to do to gain marks.

On the next 3 pages are the outcomes and their performance criteria together with some brief notes explaining what is involved. The shaded areas contain points that your teacher/lecturer will look for when marking your project. You will see that the explanations link closely to what you now know as the analytical approach.

Outcome 1: Demonstrate an analytical approach to a computing problem

PC

a)	Main stages of the analytical approach are accurately identified.	Your project must be based on a computing problem or situation that needs resolved. By 'resolved' we mean that either a solution is achieved or the issues are clarified so that a solution is more likely. Your problem must provide sufficient scope for a project to include all the stages of the analytical approach and you need to state early on in the project the tasks you are going to perform at each stage.	• Clear consideration of all stages; analysis, design, implementation and testing .
b)	Project proposal is clear and concise.	You must clearly describe the scope of the project and set the limits by considering what is to be tackled and what is not. In setting these limits you will not only be specifying the extent of your project but you will also be providing a way to evaluate it if you pass the project unit.	• Independent work by candidate • Complex problem appropriate to Advanced Higher. • Scope of project is clearly communicated.
c)	Project specification is clear and accurate.	How will the problem be resolved? How will you know your project has reached a successful conclusion? You must say exactly what you expect to be the outcomes of your project.	• Identified and defined clear boundaries for problem. • Performance requirements and the capabilities and limitations of the resources available considered in detail.
d)	Selected strategy is appropriate to the nature of the problem.	You should not just pick one strategy for resolving the problem even if there is a obvious one. Explore other possible approaches, as this will help you to make your final choice and to justify your selection. Eventually you will come to a point when you choose what you consider to be the best strategy; you must write down the reasons for selecting it.	• Relevant range of strategies considered. • Convincing reasons given for the selected strategy.
e)	Design of the solution is clear and complete.	Now it is time to plan in detail how you will carry out your strategy; a top-down method of design, drawing on what you have learned at Higher might be appropriate	• Detailed design of the chosen solution. • All aspects of design documented appropriately.

Outcome 2: Demonstrate knowledge and understanding of relevant computing concepts

PC

a)	Prerequisite knowledge and skills are accurately identified.	Your project must be based on and extend the level of knowledge and understanding for Advanced Higher. You will need to identify the additional knowledge and skills you require to meet the scope of your project – i.e. to take you beyond Advanced Higher.	• Clear understanding of knowledge and skill enhancement required to match scope of project.
b)	Sources of information are identified accurately.	You will need to consider a wide range of sources of information and select the sources that are most appropriate to your project.	• Considered a wide range of sources of information appropriate to the problem. • Selected the most appropriate sources within the limit of the resources available.
c)	Information is collated efficiently.	It is very important that you have a plan for your project so that you can make the best use of your time. You should make good use of available resources (e.g. libraries, experts, WWW) in the way you identify and gather information. The information you gather should be well-organised.	• Thorough evidence of planning and use of his/her time. • Collated information is well-organised and well-presented • Means of collation makes good use of available resources
d)	Knowledge and understanding are accurately communicated.	Your new knowledge and understanding should be well-presented and comprehensive. It should be clear from how you present this knowledge that you have adopted an analytical approach to your project.	• Complete understanding of concepts. • Communicated this in a convincing manner.

Outcome 3: Implement a solution to a problem

PC

a)	Hardware and software are used efficiently and effectively.	The marks in this section are allocated to how effectively and efficiently you use the hardware and software available to you. Your teacher/lecturer will be monitoring the progress of your project continually, looking to see if you are using the hardware and software effectively, managing your time on the computer efficiently, working in a purposeful way, and reporting back when you should.	• Good use made of relevant features of software and hardware available.
b)	Implemented solution adheres to the design.	In presenting the resolution of your problem, it should be clear that you followed through the design as detailed in the previous section. Any modifications to the original design should be logged in detail and the reasons for them given.	• Design completely implemented. • Clear evidence of design **before** implementation. • The solution matches design closely and reasons are given for any deviation from the design.
c)	The solution is accurately documented using appropriate vocabulary.	You will need to provide complete documentation of the resolution you have implemented. For a software development project this should be design (to include problem definition, data types, data structures, algorithms), program code, program listings (with internal commentary), test runs, User Guide and Technical Guide. For an investigative project, it should include the plan of the presentation, the presentation itself, the script of the presentation, User Guide and Technical Guide.	• Complete documentation is provided to support the design including commentary, user guide and technical guide as appropriate.
d)	The solution is systematically tested using appropriate test data.	Your solution will need to be well tested and tested in a logical manner. In an investigative project, you must thoroughly test and justify any conclusions you reach.	• Complete testing with clear evidence of consideration of the end user.

There are three points to note:

(a) If you omit or pay scant attention to important stages of the analytical approach, e.g. considering alternative strategies, then you will lose marks for those stages and you will not be able to get these marks back, even by excellent work elsewhere.

(b) Your teacher/lecturer cannot give you more than the agreed number of marks for your project no matter how good it looks. Therefore, do not spend so much time on the appearance of your project at the expense of the content or the neglect of your studies in the other parts of the course.

(c) It is unlikely that you will have completely understood this table on your first read and it is likely you will forget a lot of it over the 60 hours of your project. However, it does explain to you how you will earn marks so you are advised to keep it inside your project folder and re-read on several occasions, particularly as you finish the work for an outcome.

Writing a Project Proposal

Your Project Proposal is the first part of the evidence you will gather for your project. Your teacher/lecturer will be assessing you in terms of:

PC 1 (b): project proposal is clear and concise

- level of problem is appropriate to Advanced Higher
- candidate shows initiative on identifying problem
- candidate communicates clearly using appropriate vocabulary.

Your Project Proposal should include:

- an outline of the problem for somebody who is unfamiliar with the topic area including a description of the context of the problem
- a more detailed explanation of the problem with evidence of how it will go beyond the Advanced Higher course
- a statement of the limits of the project by considering what is to be tackled and what is not.

Do not be confused between 'identifying a problem' and 'describing the solution'. For example, your proposal should not contain statements like 'The problem is to write a program to …', or, 'The problem is to draw up a strategy for implementing Microsoft Outlook for email and scheduling tasks …'. A problem definition should be based on **what the user or context requires**; your solution to the problem comes later. If you do not make this clear distinction then you will not be able to show you have followed all parts of the analytical approach in your project.

As a result of the discussion with your teacher/lecturer you may proceed to a more detailed analysis of the problem, or you may have to modify your original idea, or retrace your steps and identify a different problem, either in the same area of interest or in a different area altogether.

Writing a Project Specification

Once your teacher/lecturer has approved your Project Proposal, it is time to sit down and write a Project Specification. Your teacher/lecturer will assess this by referring to the following:

PC 1 (c): project specification is clear and accurate
- boundaries identified
- consideration of input, output, process and performance requirements
- consideration of capabilities and limitations of resources.

The Project Specification should extend to at least two or three pages and include details of:
- the project boundaries
- the objective(s) which will state what you intend to achieve through your project
- the requirements in terms of inputs, outputs, processes and performances
- your detailed plan for the project
- hardware and software resources available to help you with the project.

You will be used to interpreting these bullet points with regard to a software development project but they need to be interpreted differently for an investigative project. In a software development project, all these bullet points relate to the design, implementation and testing of your software solution; in an investigative project, they relate to what **you** will do in the investigation. Thus:

- the project boundaries: Define clearly the boundaries of your investigation. For example, investigating the use of intelligent robots in industry would be too vague and unlikely to reach the level required for Advanced Higher. However, investigating the technology, costs and implications of the use of intelligent robots in a local factory to which you have access is likely to give you the depth of detail and treatment required for Advanced Higher.

- the objectives: State clearly the purpose of your investigation. In the above example, the objectives of the investigation might be to increase your knowledge and understanding of the industrial applications of intelligent robots and to understand more about the technology that makes them work.

- the inputs Outline your initial understanding of the situation. Again using the above example, the inputs might be an outline of how intelligent robots are currently used within that factory.

- the outputs Set yourself specific goals in terms of increasing knowledge and understanding.

• the processes	Identify the knowledge and understanding that you need to achieve your goals and how you will set about acquiring it.
• the performance	Set yourself a series of questions which you will be able to answer at the end of the investigation. These questions will relate back to the objectives that you set yourself.

In this Project Specification you will extend what you have already in your Project Proposal by giving the background to the problem and incorporating an analysis of the requirements of a solution to the problem. The summary should include a clear statement of your objectives. You should also indicate how you intend to tackle the project by describing your plan of action and supplement this with a timetable showing what you intend to do and when. It should be emphasised here that this timetable can only be approximate at this stage and will require refinement as you move on to the detailed design of your solution.

You can think of this Project Specification as a contract between you and your teacher/lecturer; you will use it to keep yourself on course. Do not grudge time spent on this Specification as it forms the second part of the evidence that makes up your project.

Consider alternative strategies

During this stage you will gather and order information related to the background of the problem. This will allow you to consider a range of possible strategies to solving your problem. Then you can select, with reasons, a strategy that you think will best lead to a solution before moving on to the detailed design of a solution.

This is what your teacher/lecturer will use to award marks:

PC 1 (d): selected strategy is appropriate to the nature of the problem
- alternative strategies considered
- strategy selected and selection justified

No matter what the problem is you have identified for your project, you will only be able to complete this stage if you are well informed about the problem area.

This is the time to do some background investigation or study. Gathering information requires time and effort. You will most likely be involved in searching through literature related to the problem and you may need to use a variety of sources. You may be fortunate in having a well-stocked school or computer department library with books and magazines relevant to your problem area. If you cannot find the information you need there then the next place to look is the public library. If your particular library branch does not have the books you want then they can be ordered from other branches. If you live near a university or polytechnic then you should be able to make use of their library facilities. Indeed, some may give you access to equipment to use in the implementation of your project. Ask your teacher/lecturer to help you if you think this would be important for your project.

These searches do not have to be done in the libraries if you have access to on-line searching. The Internet can be a valuable source of information but your searching needs to be well-directed.

Remember to record all the texts you reference and the contacts you make. Record also if, when and how the direction of your project is modified by the results of this background study. You will need this information later on when you collate your evidence for assessment.

It is important to record this stage of the process in case you need to retrace your steps. You might do this simply by creating a list of criteria against which to measure the advantages and disadvantages for each possible strategy to the solution. This will help you to concentrate on finding the best strategy to solving your problem. It is sometimes easy to be distracted from the problem. For example, if your project involves software development then you might assume that writing a program in a particular high level language is the only solution worth considering because you happen to enjoy programming or you want to learn a new language. However, you will lose marks in this section unless you consider a range of strategies. As a simple example, an alternative strategy to writing a program in a high level language might be to write an application using a database management system.

When considering alternative strategies make sure that you:

- make a list of problem criteria against which you can measure each strategy;
- consider each of the alternative strategies equally;
- state clearly the method for each strategy;
- indicate clearly the relative advantages and disadvantages of each in relation to the problem criteria;
- record any resource constraints which affect the feasibility of a particular strategy;
- give a clear justification for the selection of a particular strategy to the problem in relation to the problem criteria.

When you have considered a range of strategies that will meet the requirements as you have previously described them, you should be able to select one particular strategy. This choice must be supported by convincing reasons.

Detailed design

Once you have selected the strategy for your solution you can now move on to specify the design of your solution.

This is what your teacher/lecturer will use to award marks:

PC 1 (e): design of the solution is clear and complete.
- detailed design of the chosen solution.
- all aspects of design documented appropriately.

For a software development project you will follow the design process you are familiar with from Higher and/or the Software Development unit at Advanced Higher.

For an investigative project you are going to be involved in design at two different stages. Firstly, you need to design your strategy for extracting and collating information to add to your knowledge and understanding. This new knowledge and understanding will allow you to reach a resolution of the problem you have identified or to clarify the issues involved. This design should include:

- a list of activities and the sequence in which they should be carried out. You will find that some of the activities can be done in parallel while others have to be done sequentially. As an extreme example, it would be silly to wait for the response to a mailed questionnaire before acquiring statistical skills. On the other hand, you have to wait for survey results before you can begin to analyse them;
- an estimate of the time required for each activity;
- the design of suitable methods of collecting information. Methods of collection include notes from books, keeping a logbook, interview notes, questionnaires, tape recorders and data logging equipment;
- a suitable method of organising and keeping the information;
- a suitable method of data analysis.

Secondly, you have to design your computer presentation of the outcome of your investigation. The design should include:

- the information to be included in the presentation;
- a suitable method of presentation;
- the sequencing of the information in the presentation;
- links between the elements in the presentation;
- any scripting required to link the elements.

For Advanced Higher you will be expected to go beyond a simple sequence of slides which might easily be generated using a design template. You should provide alternative routes through your presentation. Also consider using graphics where these would enhance your presentation.

Implementation and testing

If your problem solution requires you to write a high level language program then this implementation stage should be familiar to you from your experience at Higher. Remember that the implementation should match the design and that you will be expected to use the features of software to best advantage. For an investigative project, you will be implementing your design of how you are going to collect and analyse the information you need and also your design for the computer presentation of your investigation.

Perhaps the implementation of your design requires you to carry out experiments or collect data through further research. If your project involves collecting data in the field then you must take steps to ensure that the data is accurate. This will mean, e.g., using a suitable sample to allow generalisation and of sufficient size to notice particular trends.

Testing should be carried out as you proceed following a test strategy that you have previously developed. Conclusions should be written down as you proceed and you should ask your teacher/lecturer to comment on them. You will need to review these conclusions as you go along. In an investigative project, you must thoroughly test and justify any conclusions you reach.

As you proceed through this stage you should ensure that:

- the implementation matches the design;
- any deviation from the design is recorded and reasons noted;
- where appropriate, there is evidence that the implementation has been tested by the end-user;
- there is a full commentary on the results of testing;
- there is evidence to support the implementation and testing, e.g. printouts, photographs, diagrams, magnetic media.

Here are the points against which your project will be marked.

PC 3 (a): hardware and software are used efficiently and effectively

- good use made of relevant features of software and hardware available.

PC 3 (b): implemented solution adheres to the design.

- design completely implemented
- clear evidence of design before implementation
- the solution matches design closely and reasons are given for any deviation from the design.

PC 3 (c): the solution is accurately documented using appropriate vocabulary.

- complete documentation is provided to support the design including commentary, user guide and technical guide as appropriate.

PC 3 (d): the solution is systematically tested using appropriate test data.

- complete testing with clear evidence of consideration of the end user.

Writing the evidence for assessment

The main aim in writing the evidence is to convince the assessor that you have met the criteria for the project. Hence, you will want to structure your writing in such a way that your work is presented in the most effective manner.

You should be guided by your teacher/lecturer on how much to write as projects differ in nature and no rule can be laid down for all projects. For example, a project that results in the building of a hardware interface may have fewer words in the written evidence than one that requires the candidate to carry out an extensive literature search.

In the evidence you submit it should be clear what material and ideas are original to you and what is from the work of others. It is important that you show you have understood the ideas of others by summarising them and using them with the rest of your own work. It may be necessary at times to use direct quotations but do not simply copy out sections from books or magazines and present the information as if the ideas were all your own. If you want to use a direct quotation then enclose the text in quotation marks.

In your list of references you should list the books and articles in alphabetical order of author giving such details as author and initials, title of book or article, ISBN, place of publishing, publication date and any pages referenced. If you are referencing an article you should also give the name of the journal containing the article. It is important that you discipline yourself to gather and write up the information as you go along; if you don't you will find it very tedious and time-consuming to retrace your steps to find all that information for a quote you want to include.

Possible problems

Earlier in this section, much emphasis was placed on the need for you to draw up a project plan. However, having a plan is no guarantee that the project will reach a successful conclusion. You may meet problems, some avoidable and others unexpected, which you will have to deal with in such a way that the completion of your project is not threatened.

The worst thing that could happen is that you never manage to finish your project because of some problem that might have been avoided. Such problems are:

(a) insufficient time spent on your project.
This may arise if:
- you are overcommitted in your selection of subjects along with Advanced Higher Computing Studies
- you receive an unconditional University place by January and you lose interest in the course
- you spend too much time on interests outside school/college.

(b) failure to use your project plan.
You must meet the deadlines as indicated by the critical points in your project plan. If, for some reason, you miss a particular deadline, you should re-schedule the affected phases or events in your plan. There is no point in soldiering on if, for example, some stage of your project proves more difficult than at first imagined. You should admit there is a problem and seek advice.

(c) lack of supervision.
Your teacher/lecturer, as supervisor of your project, can be expected to give advice when asked for it and direction when he or she thinks it appropriate. However, as you have been advised elsewhere, much of the responsibility for your progress lies with you. You must meet with your teacher/lecturer at the scheduled class times (just because it's project day does not mean you don't have to appear) and you must seek him or her out as you think necessary at other times.

(d) loss of motivation.
Earlier in this section you were advised to select a project of some significance to help guard against a loss of motivation at a later stage in the project. Nevertheless, a loss of motivation can occur through a combination of tedium, frustration, lack of progress and a reduction in interest. Your teacher/lecturer will know when you are finding the going tough and will have a chat with you to attempt to resolve the problems you are having. A common sense approach is to regard tedium and frustration as inevitable from time to time and this can help to overcome motivational problems. If you are finding it difficult to make progress on a particular activity, it might help to leave this activity, assuming it is not a critical one, and switch to another parallel activity.

(e) underestimating the time for writing and collating assessment evidence.
If you are not careful you will find that you put off writing your evidence for assessment and gathering together the relevant items until you find that you do not have enough time to do it properly. Remember that written and oral communication are very important elements of the project and your project will be largely assessed on the written evidence you provide.

(f) Not keeping accurate notes of all your sources of information.
If, for example, you do not take time to make an accurate note of the source of a certain quote from a book when you come across it, then it will take you very much longer to find it again later on when you want to include the quote in your evidence for assessment.

Using your project for the coursework for the Advanced Higher course

When you have satisfied the requirements for all 3 outcomes of the unit **Computing Project**, you may wish to use your project to count towards course assessment for the Advanced Higher course. The project, and an evaluation of it, counts as 50% of the course assessment. Please note that you **must** submit this evaluation if you want to complete the Advanced Higher course.

The following gives you an idea of how to tackle this additional item for the coursework – the project evaluation.

In the Project Specification you wrote down a set of intended outcomes that you must now use to evaluate your project. If, for any reason, your implementation does not satisfy any of the outcomes then you will need to give an explanation. Don't worry about the differences – changes do take place over 60-hour projects. Just make sure that your explanation is convincing. Marks will be awarded for the clear evidence of measuring against the relevant outcomes.

You should also identify all limitations and future developments, and specify clearly any relevant modifications to the resolution of your problem.

You should:

- attempt to evaluate your project in terms of
  (a) its effectiveness against the intended outcomes
  (b) the limitations caused by the implementation method
- attempt to specify any modifications or suggest improvements in such a way that these could be implemented.

In a software development project you are evaluating your solution against the Project Specification. In an investigative project you are evaluating two things - the outcome(s) of your investigation and the effectiveness of the presentation of the outcome(s).

Your evaluation should extend to approximately 400 words.

Here are the points against which your evaluation will be marked.

Evaluation

Consideration of effectiveness against the intended outcomes.

- all outcomes considered. In addition, appropriate vocabulary used.

Consideration of the limitations caused by the implementation method.

- details of valid limitations.

Consideration of modifications or improvements.

- range of modifications or improvements considered.

COMPUTING PROJECT FAQS

1. How much time does the project take?

The project is designed to last for 60 hours. This includes the time it takes to write up what you do.

2. Do you have to write a program for the project?

Not at all. You can choose to develop a piece of software for your project if that is what you are interested in, but you are free to work on a project that does not involve programming.

3. Will the SQA provide a list of projects to choose from?

No, it is up to you to come up with an idea. There is a list of topics your teacher/lecturer can give you which might guide you towards a suitable project. It is important that the project is at the right standard for Advanced Higher.

4. How long does the project report have to be?

You don't have to write a final project report. Each project outcome will be assessed as you progress through the project and you have to write evidence for the assessment of each outcome. Since every project is different, it is not possible to say how much you need to write.

5. Do I need to have my own computer to do the project?

No, the Advanced Higher course is designed so that you will have the 60 hours for the project in class. Part of the project planning involves you in thinking about the resources available to you to do the project so you should work within the limits set by the resources.

6. How is the project marked?

The project consists of 3 outcomes and each outcome has its own marking scheme. Your teacher/lecturer will be able to give you more information about what you have to do to gain the marks available for each outcome. He or she will mark the project and keep you informed of your progress.

7. When should I start the project?

Your teacher/lecturer will guide you on how the Advanced Higher course is organised. You may choose to wait until you have completed the other units in the course and base your project on one or both of those units. On the other hand, you may base your project on an area of computing not covered in the other units and choose to start your project earlier.

8. How is the project used for course assessment?

Course assessment consists of coursework and a written examination. Your project is the first part of the coursework. If your project meets the requirements for unit assessment then you can choose to complete the coursework. For this you will need to write an evaluation of your project (about 400 words). Coursework is 50% of course assessment and this is made up of 45% for the project and 5% for the evaluation.

QUICK REFERENCE GUIDE

- The project lasts 60 hours.

- You have to pass 3 outcomes which are:
  - Demonstrate an analytical approach to a computing problem.
  - Demonstrate knowledge and understanding of relevant computing concepts.
  - Implement a solution to a problem.

- Your project can come from any area of the Advanced Higher course or from outside the course.

- The project can be a software development type or an investigative type.

- Your project should be based on a problem that needs solved.

- You have to follow an analytical approach:
  - Identify the problem
  - Define the boundaries of the problem
  - State the user and system requirements
  - Consider possible strategies
  - Select a strategy
  - Design a solution
  - Implement the solution
  - Test the solution

- You have to provide written and/or oral evidence for each of the 3 outcomes.

- Coursework = project + evaluation of the project.

- Coursework counts for 50% of the marks for Advanced Higher Computing.

CHECKLIST

Read the **Candidate's Guide** to the project ☐

Read and understand the marking scheme ☐

Select a project topic ☐

Negotiate with teacher/lecturer on project topic ☐

Write a project proposal ☐

- an outline of the problem
- a description of the context of the problem;
- a more detailed explanation of the problem with evidence of how it will go beyond the Advanced Higher course;
- a statement of the limits of the project

Write a project specification ☐

- the project boundaries;
- the objective(s) which will state what you intend to achieve through your project;
- the requirements in terms of inputs, outputs, processes and performances;
- your detailed plan for the project;
- hardware and software resources available to help you with the project.

Teacher/lecturer approval for project ☐

Negotiate with teacher/lecturer on project marking scheme ☐

Consider alternative strategies ☐

Select a strategy ☐

Acquire additional knowledge and skills ☐

Collate information efficiently ☐

Provide a clear and complete design of solution ☐

Create test data ☐

Outcomes 1 and 2 assessed ☐

Implement solution making efficient use of hardware and software ☐

Solution matches design ☐

Test the solution thoroughly ☐

Provide documentation including technical and user guides ☐

Outcome 3 assessed ☐

Evaluation ☐