The Institution of Engineering and Technology

Final Year Project

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Contents

1. Working in teams

Sometimes you may find that you are asked to work on a final project in a team. Believe it or not this can be harder than trying to work on something alone, as you need to find everyone's individual strengths and weaknesses and take advantage of them to make the project a success.

On top of that, not all of us deal well with stress, so there is also the issue of keeping everyone happy and getting along together!

Looking beyond your project, teamwork is likely to play a big role in your future career as there is a significant shift taking place in organisations throughout the world towards increasing the emphasis on the group or team. An engineer uses many technical skills when designing a device, product or system. These skills represent the knowledge acquired through training and experience, however they are useless if you are unable to communicate and work with others. In addition to a strong set of technical skills, a good engineer must grasp some non-technical skills that include the ability to work in a team, generate new ideas and keep good documentation. Seldom does an engineer simply sit down and get right to work on the technical details of a project.

Definition of a team

The definition of a team is a group of people, each of whom possess particular expertise; each of whom is responsible for making individual decisions; who together hold a common purpose; who meet together to communicate, collaborate and consolidate knowledge. Keep that in mind - you're working to achieve something as a group:

- Together.
- Everyone.
- Achieves.
- More!

Becoming an effective team

There are certain characteristics that you'll find from any effective team. Remember these - perhaps even write them up on a sheet and put them up on the wall of your team meeting area. Of course you'll have disagreements but if you try to remember these characteristics and their importance, you should survive the experience with your project and friendships intact.

Characteristics include:

- Trust - A firm belief in the honest and reliability of another individual or individuals.
- Co-operation - The ability to work together with others in an attempt to reach a desired goal.
- Support - The encouragement and/or help of someone in or toward the completion of a given task/goal.
- Cohesiveness - A bonding or sticking together of individuals in a given situation.

How to make your team work

An effective team is one that works well together. It functions at its maximum potential when solving a design problem and thrives on the special capabilities of its individual members. One key characteristic of an effective team is a good supportive attitude among fellow teammates and team activities. Team morale and a sense of professionalism can be enhanced if team members agree upon some rules of behaviour. The following set of guidelines illustrates one possible approach to building an effective design team.

Define clear roles

Each team member should understand how he or she is to function within the team. The responsibilities of each individual should be defined before work begins on the project. Roles need note be mutually exclusive, but they should be defined so that all aspects of the design problem fall within the jurisdiction of one or more team members. By doing this, no problem will fall between the cracks during the design process.

Agree upon goals

Members of the team should agree upon the goals of the project. This consensus is not as easily achieved as you may think. One teammate may want to solve the problem using a time-tested, traditional approach, while another may want to attempt a far-out esoteric path to success. Define a realistic set of goals at the outset. If the design process brings surprises, you can always redefine your goals midway through the project.

Define procedures

Teammates should agree on a set of procedures for getting things done. Everything from documentation and the ordering of parts to communication with professors, clients and customers should follow a predetermined procedure. In that way, misunderstandings about conduct can be greatly reduced.

Develop effective interpersonal relationships

You must learn to work with everyone on your team, even with those individuals whom you may personally dislike. In the real world, a client will seldom care about any conflicts that occur behind the scenes. It's a sign of engineering professionalism to be able to rise above personality clashes as you concentrate on the job at hand. Be nice. Be professional. Forbid name- calling, accusations, and assigning fault between team members.

Define leadership roles

Some teams work best when a single person emerges as a chosen leader. Other teams work better by consensus using distributed leadership or even no leadership at all. Regardless of your team's style, make sure that the leadership roles are clearly defined and agreed upon at the start of the project.

The advantages of working in a team

There are many benefits to working in a team. Take combined skills for instance. A team has better combined skills than any one of its members. An idea expressed in a team can have a snowball effect, inspiring new ideas that the members might not have thought of on their own. They become a natural learning environment, training each other in new skills.

You can also garner more information from working in a team. Team members with different backgrounds and skills can present a wider perspective on which to base decisions. Tasks are not overlooked or forgotten as they sometimes are when being approached by one individual.

Of course, one important result of working in teams is the development of a high level synergy; the sum of the team's efforts is equal to more than the sum of the individual parts. Often a team can reach heights unattainable by any of the individual members.

The final thing worth noting is that working in teams allows for high motivation as the group feeds each individual's needs to have personal significance; and the team reinforces each member's sense of self. This encourages members to work hard for the benefit of the team - and the team is motivated because its members get their emotional and intellectual needs met by the team.

With thanks to:

Isobel Brown, The IET

Hugh Griffiths and Nina Thornhill. UCL

Northeastern University, Boston

2. Use of literature, standards and bibliographies

Literature plays a strong role in any form of essay, dissertation or project.

It can be a source of information for research purposes and therefore noted in your bibliography, but it is also used as proof of your arguments and therefore has to be referenced within your report.

So where do you start? Firstly, you need to find the best sources of information for your work. Simply check out your local libraries (Its often good to go to your county's library headquarters - that will have the largest number of useful books in one place) and search using key words. Be careful not to be too generic, think more specifically about what you need to find out. Searching using a key word such as semiconductor won't really work for example, as the word will appear too often to be useful.

Also, don't forget to use the Internet to your advantage, search engines such as Google will help you find out lots of information, and of course, as long as you've referenced it in your work or noted it in your bibliography, there is no problem using it.

Use of literature

An important part of any project is to appreciate what has been done previously and read up on what your predecessors achieved. This then needs to be demonstrated in your work and so your tutors will be expecting you to review and use a certain number of literature sources.

As early as you can during your project, put time aside to conduct a literature review, where you research a large number of publications of one form or other (use all routes open to you - journals, papers, books, Internet…). This way you find out the most relevant information for your project, and know where to go for your citations.

On average you can be expected to mention 8-10 relevant published papers, journals or books of some form, but always check what your university expects from you, so you don't get caught out. Always cite documents regularly however, as projects with little or no literature citations are likely to be penalised.

Citation and reference standards

Most of our work is done in isolation, but builds on the work of others we have worked with, or come across during our research. So, with this in mind, it is important to give credit to those who have helped us by making sure we cite their articles, books etc as references.

In terms of standards, it's always useful to check with your university as most have a specific standard they will expect you to use. If not, the rule is to be consistent. Choose a style to follow - in terms of symbols and technical vocabulary etc as well as citation and referencing, and then stick to it.

Standards should be applied to symbols used, notation and technical vocabulary, and one useful site to check out on this front is: http://bsonline.techindex.co.uk.

With regards to literature citation throughout your work, the Harvard standard for book, journals and paper citation is a well-known and respected form. Perhaps if you don't have a specific university standard to follow, this might be the one to use. Here is a good place to start: http://www.library.hbs.edu/guides/citationguide.pdf.

Again, there are specific citation guidelines for using electronic media references. A very useful site for advice on this matter is: http://www.apastyle.org/elecref.html.

In terms of both citing and referencing, there is usually an outline you can use. The advice below can give you a rough guideline to follow, but as we keep reminding you, check in with your university for the correct outline to follow.

When and when not to cite

According to the Harvard standard, you 'cite a source by making a notation or signal in your paper that refers your reader to a place where you give full publication data about the source.'

If you begin to find that you are citing from documents left, right and centre then it may be time to worry. This means you are taking too much from other people's ideas and not offering you own. With that in mind, try to get a balance where you compare the work you've done to others rather than solely discussing what they've achieved.

Also don't cite things that are common knowledge; in the sense that this information can be found in multiple sources such as encyclopaedias and text books.

Details to include when referencing are:

- Book: Authors name; surname first, then first name and initials, year of publication (in brackets), title of book in italics and publisher.
- Magazine or Newspaper: Author, year of publication, titles of article in 'single quotation marks', title of newspaper or magazine in italics and date of publication.
- Online sources: Author, title of document in 'single quotation marks', date of publication, full URL and date of access (in brackets).

Bibliographies

The bibliography differs from references in that it contains a list of the general reading you partook in for the project, whereas the references are specific to a point or argument being made in the text. It is usually listed in much the same way as the references though not normally cited in the text.

There are many different standards in terms of writing both bibliographies and references, so keep this in mind. For example, some tutors like to see bibliographies written out in alphabetical order, others in date order and others in use order so keep this in mind - so just make sure you remember to check!

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3. Mind management

Andrew Wilcox explains how mind mapping and MindManager can help you improve communication, speed up project development and enable you and the team to access project knowledge.

Creating and managing projects is something we all do. Sometimes we think we have control of everything and sometimes we feel as though we have very little control. In fact neither is quite true. Actually it is not control that matters. What matters is having quick access to correct and full information, a process to make sure everything is covered and the ability to share this information rapidly with all parties. It does not matter where you are in the team, everyone needs the best possible view and insight in to their role and responsibilities in the project. In a well-run project all members of the team know why, who, where, when, what and how everything is. This article seeks to show how Mind Maps and MindManager can help you get the picture, share the information and be in control.

Tony Buzan started mind mapping in the mid-70s. He wrote several books, had a TV series and created a very large and wide variety of people who use his techniques. Tony's basic proposition is that mind maps have a central idea out of which radiates the details. Mind maps should be colourful, organic and pictorial. This helps you to memorise them and one of mind mappings first successes was with students.

Mind maps are now being used to write books, plan events, overview processes, plan interviews, and prepare presentations, by people ranging from preachers, students and teachers to senior managers in multi-national companies and government organisations. This article, however, will focus on how to use maps in projects, including your final year project.

MindManager software was created by Mindjet (http://www.mind-map.com) ten years ago and has been distributed for many years in the UK by M-Urge (http://www.murge.com). MindManager takes the original concept and gives the PC user the ability to create maps in a structured way and use them within the Microsoft environment. The graphics are handled for you, inserting or clicking adds branches, and links can be made to external documents. You do not have to draw anything unless you a want a new symbol. The style of the map is controlled by various toolbar functions. You can have very organic maps littered with symbols or just plain text on lines. What you are actually constructing is a database, which is visualised as a map. Branches can have symbolic codes, colours and highlighting which can be used later to control views or output to other applications.

The added value of MindManager is the depth of detail you can give to branches and the branch relationships. Branches can have notes containing text, tables, pictures and hyperlinks. They can turn into paragraphs, chapters or Web pages. They can have dates, resources, priorities and hyperlinks. Finally the map can be converted to a Word document or PowerPoint or a website; or it can be synchronised with MS Project and Outlook and exported to other project managers via MPX files. There seems to be some key project items in there.

Task breakdown

Creating the task breakdown and relationships is key to a good project start. There are many ways of doing this, from covering a wall in 'post-its' to direct entry into your project-planning tool. MindManager is a very effective tool which lies somewhere between the two. You can get the creativity of the post-its by adding task branches as they occur to people in a brainstorming meeting. Having a PC projector is better than huddling around a monitor or taking it down on paper or flipcharts and creating the map after the meeting. Alternatively, everyone brainstorms individually and the project leader then combines the maps and shares the result online or at a team meeting. Structuring this information is easy. Branches can be dragged and dropped, whole assemblies can be dragged to different positions, and tasks can be numbered and sorted. Members of the project team in different locations can enter information using the built-in conference facility from remote locations.

Now you can start adding more information: known dates, estimated duration, task owner, priorities and categories. Maps are normally read from 1.00 p.m. going clockwise. You can add relationships and other important data such as dates and resources. In the application a task pane displays the data for the selected task and provides one of the data entry methods. When you have a large number of tasks, the level of detail exposed on any branch can be controlled. So just one stage can have its entire task exposed. Alternatively sub-projects can be turned into new maps with a link to the parent project. These are added in MindManager using the branch relationship tool.

After synchronising with Microsoft Project a full project time plan can be produced; useful when you consider that your final year project usually constitutes one quarter of your final year, and that one quarter of 23 weeks is about 6 weeks (42 days) - you cannot do a PhD level project in 42 days! All the task names, timing and resources have passed to the project plan. If changes are made to the tasks, then after synchronising, these changes will be visible in the map. Once synchronised, MS Project becomes the master for certain pieces of data: dates, resource and duration. But percentage complete can be changed from MindManager and new tasks added.

Don't just use MindManager to create a project, use it to monitor project progress. You can import a project at any stage, and then using the Power Select function you can look at Bill's tasks or the late ones etc., and input the missing tasks. This gives a very different view to a time line or the critical path analysis view of the project. New risks and opportunities will be spotted. Any amendments made in the map can be synchronised back to the project plan.

MindManager software is also able to export information to PowerPoint and Outlook, create extensive websites and has a range of project specific templates. There are a number of companies creating add-ins to MindManager, many focused on its project application. The best example of this is MindManuals (http://www.mindmanuals.com) which has created a complete project guide. This takes the user through the project process, provides them with starter templates and prompts the user continuously to think carefully about the project.

With thanks to:

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4. Conducting meetings

If you are working on your final project as part of a team, then there will come a time when you will need to arrange meetings to discuss how the work is going, and how to move things forward.

For whatever reasons; interruptions, delays, chatting etc, meetings can take much longer than necessary becoming time-wasting exercise rather than useful communication tools. So with that in mind, here at the IET we have come up with some useful advice to help you make the most out of meetings and show you the best ways to go about conducting them.

Know where you are going

What do you want to accomplish between the beginning and the end of the meeting? What is the purpose? You should always have a clear, specific objective whenever you participate in a meeting. Come up with a plan of action, brainstorm a long-standing problem, educate, inform etc. Whatever it is you want and need to accomplish, make sure you and everyone at the meeting is clear on why you are getting together. Meetings without a clear purpose are meetings that become a waste of precious time, and when working on something like a final project, every minute counts!

Have a set agenda

The cause of failure in almost every endeavour comes from a lack of thoughtful planning, and meetings are no different. Consider the issues at hand and put together a simple outline before everyone arrives, making sure you stick to it. List all the points you need to discuss and the amount of time you will be spending discussing each issue.

You have to keep focused to these points otherwise the meeting can go off on a tangent and you could be discussing the number one single in the charts this week rather than more pressing issue such as your final project. With that in mind, meetings are always more effective when a leader controls the direction of the meeting and keeps everyone focused on the agenda. Even the best-intentioned participants can sometimes start discussing topics irrelevant to the issue at hand, and an effective meeting leader will politely stop such digressions quickly.

Schedule intelligently

The best times for meetings are at 11am and 4pm. People are more likely to focus on the subject at hand before lunch and around quitting time. However, try to avoid scheduling meetings right after lunch. Most people experience an energy dip right after a meal, and the larger the meal the less their ability to pay attention and participate.

Also, the best time to schedule a future meeting is at the end of one. Rather than making phone calls and sending letters announcing an upcoming meeting, set a time and a place to meet again whilst everyone is still together in the same room. This will be a time saving exercise in its own right!

Be prompt!

A successful meeting is all about time management. If a meeting is scheduled to begin at 11am, start at 11am sharp and not at 11.06 or 11.15. There are those of us who have a bad habit of arriving late, and students are often stigmatised with that label, but to make those who arrive on time wait for those who do not is both unfair and inconsiderate - they have work they need to be getting on with, just as you do!

When people know that your meetings start promptly, whether they are there or not, they will arrive on time more often. So be punctual, and begin every meeting on time, every time.

Meetings should not only begin at a precise time, but end on time too. As well as having an agenda you stick to, give yourselves a deadline by which the meeting must end. Time limits create a sense of urgency, and all of you will usually react by concentrating on the issues at hand, avoiding the idle chatter that can come about easily in these situations. Deadlines really encourage you all to be more efficient and effective, especially as the end of the meeting approaches.

Lengthy meetings tend to be de-motivating, so when considering what time to have your meeting end, consider a maximum of two hours as a good guide. Amount of time to be spent on each item of the agenda will then be able to be determined by the amount of time available for the whole meeting. Work out a rough plan of how much time is available for each item, and put this on the agenda itself to act as a guide.

If time is really an issue and you want to have a very brief meeting that will last no more than 10 minutes, have everyone stand during the meeting. You'll find that there is a correlation between comfort and the length of conversations, and standing up is less comfortable than being seated, so you'll find you'll get through things much quicker without a chair!

Taking minutes

To be truthful something you needn't really worry about is taking minutes. On occasion minutes may become necessary, but for the majority of the time, a simple 'action' reminder will be enough for each of you to go away knowing what to work on next.

It may be however, that you have been asked to keep notes from all stages of your work, including meetings as an entry in your logbook. So only prepare detailed written notes where necessary, but think very carefully before you entirely omit any sort of written note or reminder.

A written note after a meeting serves three specific purposes:

- A prompt to action - a reminder to those who have taken on tasks at the meeting to do them and do them on time.
- An 'aide memoire' at the next meeting - forming a link between sessions of regular meetings, ensuring that all points are reported or progressed further. This is often represented on the agenda as 'matters arising'.

- A record - what has occurred and particularly what decisions have been made. This may be an essential permanent record (perhaps an addition to your project log book) or merely a convenience.

If notes are to be taken, they must be:

- Accurate - this is obvious but important; any sloppiness of reporting or omissions can cause problems.
- Objective - whoever prepares them mist report what was said, not inject their particular point of view.
- Succinct - unless they summarise effectively they are likely to go unread.
- Understandable - if they are to provide a useful spur to action and a correct record they must be clear.
- Business-like - making it clear what action is expected of whom by when.

One final piece of advice on taking minutes / notes. If you are the one responsible for compiling them, do so as soon as possible after the meeting has finished. This is simply because you are more likely to remember the details accurately at that stage, plus many people will not get down to the actions they may have been delegated until the notes arrive back with them, so early circulation can reduce any delays in implementation.

Worthwhile?

Is your next meeting really necessary? This is something you need to consider. Don't have meetings during project time because it's a routine, have them because you all need to be together to discuss some issues that have come up, or you need to see what stages you've all got to with the work etc. The meeting that appears essential on Monday might not seem so urgent by Wednesday.

If the need for a meeting doesn't seem as great as it did when you first planned it, do everyone a favour and cancel it. No-one really likes meetings, so they won't be angry at you for calling it off; more likely they'll be happy because some extra time has now become available to concentrate on the more important aspects of the project, such as work.

With thanks to:

Hugh Griffith and Nina Thornhill. UCL

5. Making an effective presentation

We've put together some advice below that should help your presentation stand out (in a good way) and allow you to relax and enjoy the experience.

As part of your final project you may come across a time when you are asked to put on a presentation. Most people are not fans of standing up and talking in public, but as you are very likely to have to face putting on more than one or two of these during your career, its best to learn the basic skills of a successful presentation right now.

Planning

A key part of making a presentation is to plan it properly. Ask yourself who your intended audience is, and what you can and cannot assume they know about the subject already. They will not take kindly to you spending half of your presentation going through material that everyone is already completely familiar with, since that's a waste of everyone's time.

Equally if you wrongly assume that your audience already understands certain things, you'll have lost them right from the start. A couple of slides at the beginning just to establish a common understanding of the starting point is therefore not a bad idea.

Plan in advance what you are going to say, giving yourself a script to follow, and your overall presentation a logical structure. Before you write anything up, get a piece of paper and write down what the single most important point you want to make is, how might the subject best be introduced, what support points to your main point need to be made and in what order, and what tone or style will help you convey your talk. Doing this will help get your message across.

Your audience

Always remember to consider your audience when planning your presentation, as their experience, knowledge, needs etc can all affect the information you should be covering and also how you approach it. Use the following as a useful tool:

- Analysis - Who are they? How many of them?
- Understanding - What is their knowledge?
- Demographics - Age, sex, educational background;
- Interest - Why are they there? Who asked them to be here?
- Environment - Where will I stand? Can they see and hear me?
- Needs - What are their needs? What are your needs as the speaker?
- Customised - What specific needs do you need to address?
- Expectations - What do they expect to learn or hear from you?

Preparing the environment

Make sure you take into consideration the environment in which you will be doing your talk. If the venue is unfamiliar territory, it helps to have a look around before the talk. If it's in a large room, try out your voice. If you can get a friend to tag them along, plant them in the back of the room to see if they can hear you.

Simple things will also make your life a lot easier, and help you to come across as a professional. It is useful you see to know where the light switches and power points are, and how to draw the blinds if you plan to use slides or film. Another simple thing to do is find out how the windows open and close, and how the air conditioning works in case you need to regulate the temperature.

Timing

When planning, consider the time of day and how long you have got for your talk, as the time of day can affect the audience. For example, after lunch is known as the graveyard section in training circles as your audience is more likely to want a nap than listen to a talk, so try to avoid that period at least!

Structuring your talk

Now it's time to structure your talk in more detail

Firstly identify headings and subheadings within your presentation by looking at the subject matter through the eyes of your audience, and asking yourself 'Will this piece of information help me to achieve my favoured output?' This is important as it helps to avoid waffle.

From there choose a logical introduction point, setting out the purpose and explaining what the presentation will consist of. Next split the body of your presentation into logical sections, tailoring it to your particular audience. Lay the foundations first and build on them, then finish with a conclusion which draws together the main points that you have been making, and makes it obvious with the final slide that you've finished. Finally check that the presentation is readable and understandable through thorough practice. Simply by creating this detailed structure outline and then making yourself familiar with your presentation notes, you will have already given yourself a 75% chance of success.

With all presentations you should keep in mind the AIDA acronym: Attention, Interest, Desire and Action. Begin by grabbing the attention of your audience with a statement that is relevant to them. A common way of doing this is firstly to state the reason for your presentation, then talk to them about the advantage(s) the audience can gain from listening and finally give the audience an idea of how your presentation will progress.

Keep the interest levels of your audience high - via the use of some visual or verbal aids perhaps - and give them a desire to take action as a result of your presentation. If you have fully rehearsed your presentation and you are happy with environmental factors such as acoustics and visual aids, there is every reason for you to have total confidence.

If you project the image of a well-briefed and authoritive figure, your audience will have greater confidence in you and your message will be more effective.

Visual aids

Although it is true that the majority of people use PowerPoint for presentations, there is no doubt that it can make for a very professional presentation. Be careful not to 'overuse' it though - too many pictures can take your audiences attention away from what you are trying to say.

Whatever visual aid you choose to use, you need to find some middle ground where your slides are visually appealing but don't take the attention away from yourself. Use colour where appropriate but don't bombard your audience with too much information - make them simple to read. Using a mixture of bullet points, diagrams and charts to talk around is a good idea, but don't put in equations unless they are absolutely necessary, and don't use a font size smaller than 16 point. Another point is to aim for a sans serif font like Arial, as it is much easier to read than fonts like Times New Roman.

As a rough guide to the length of your presentation, if you are using a visual aid, you should roughly calculate the length of your talk by using the expectation that you will talk on each slide for a minute, so if you have 15 slides, expect to talk for roughly 15 minutes.

Your actions and body language

When in front of your audience you need to come across as enjoying the experience, even if you have sweaty palms and butterflies in your stomach! How can you expect them to enjoy it if you aren't?

With that in mind, your actions - conscious and subconscious - can affect the success of your talk. Did you know that the content of what you say; i.e. the actual words and their meaning only account for 20-25% of the impression you create? The style of speech - tone, inflection, clarity, pronunciation, speed, accent, loudness and pitch, takes up another 25-30%, whereas body language can account for up to 50% of that impression!

So you need to consider many things when it comes to getting on that stage. Take your voice for example. Remember to speak clearly and not too fast and rather than speak in a flat monotone, it's good to vary the pitch of your voice and also to vary the pace slightly, leaving occasional pauses for effect.

If you want to make a particularly important point, you can either raise your voice (the obvious way) or if you have their attention lower it. Lowering your voice will result in people listening more attentively, almost leaning forward to hear what you are saying.

Eye contact is another thing to get right. It is much better if you can speak directly at your audience, and engage some of them in eye contact rather than keeping your eyes down and reading from notes. This means then that you need to prepare well, and be confident enough that you don't need to read from your notes. To be effective, eye contact needs to be regular, frequent and evenly distributed. One use technique is called the lighthouse. 'Sweep' the group with your eyes, look briefly at each person and smile (but only when appropriate) regularly.

Overall body language is very important to consider. Here's a list of different forms of body language and their meanings from Drumchapel Opportunities. Some of these will come in as handy hints for your time on the stage - both for advice on how to act yourself, but also as a way of knowing how your audience is feeling…

- Holding eye contact - interest or concern with the other person. This is the single most important thing you can do to make communication work through body language.
- Smiling - shows you are following what is being said and that you are willing to pay attention to the other person.
- Fidgeting - shows some impatience; perhaps a concern with the time and a need to get away.
- Arms crossed - often a defensive posture; protecting yourself; keeping the other person at a distance; disagreeing with the other person.
- Nodding your head - signals agreement, or that you have understood what is being said.
- Covering your mouth - shows possible anxiety or lack of confidence.
- Hand gestures - may show enthusiasm and an attempt to convey something which is strongly held, or to make a particular point.
- Arms on hips - often a slightly aggressive attitude; sometimes interpreted as 'take it or leave it'.
- Foot tapping - impatience, possible disinterest.
- Head scratching - may show uncertainty, or someone having difficulty in understanding what is being said.
- Head to one side - shows interest and attentive listening.

Taking these pointers into consideration, here's some further advice to help you improve your skills and techniques.

Posture

- Whether sitting or standing you need to find a comfortable posture that also projects confidence.
- Stand with your feet apart, and your arms down by your side is a good starting point. This is known as your 'home position'. Some people find it better to have their feet apart and one foot slightly ahead of the other but whatever stance you choose, make sure you can see the whole group.
- If you sit down make sure you are alert and upright. Don't slouch and don't cross your legs.

Movement

- Once you have started your presentation you should avoid distracting movements such as pacing around the room or wild hand gestures.
- Don't feel however, that you have to stay in a rigid position and posture. Movement is an important ingredient in maintaining interest. You can move towards the group when you want to make an important point and away from them (walking backwards) when you want them to think about something.

Gestures

- Gestures can either be seen as distracting or they can add interest and impact to something you are saying depending on the extent of the movements.
- Gestures are only effective when they complement what you are saying.
- Gestures need to be synchronised with the pace of your voice and your words.

Explanations

When explaining points, particularly complex or important ones, remember the KISS rule:

Keep

It

Short (and)

Simple

If you are not using many visual aids then you can use 'verbal visual aids' that will help people understand what you are trying to get across. Try to keep them both relevant to the audience and similar to the content of your presentation.

'A speech should be long enough to cover the important points and short enough to be interesting'.

Other methods of painting word pictures include:

- Anecdotes - short story often with a funny ending. If you are talking about a very dry subject then anecdotes involving people can make them sit up and listen.
- Humour - using a joke can illustrate a point, but don't use any humour that may be taken as offensive.
- Analogies - relating an unfamiliar or dull subject to something familiar or interesting.

Participation

Good presentations often have an interactive element to them. Participation can be encouraged from the start of the presentation by inviting questions from them during the talk. Only do this if you feel comfortable though, however keep in mind that when replying to questions we are often more relaxed, natural and articulate than when delivering a prepared script.

Participation can also work the other way, as you can involve people by asking questions themselves. If your group doesn't seem very interested for example, you can ask them questions from time to time to keep them on their toes.

Use the POSE, PAUSE, POUNCE technique…put your question to the whole group, pause a while for it to sink in and then pick on someone to answer it.

The do's and don'ts

Finally, a few last do's and don'ts to help you survive your presentation experience. Above all else though, remember to enjoy it!

Do

- Practice - it is only practice that can make you a good speaker.
- Take three deep breaths before going in front of the group.
- Practice out loud beforehand. The part of the brain that controls speech is different to the part of the brain that controls thought.
- Think about how well it's going to go. Prepare yourself to be a success. Don't let your mind present you with pictures of what might go wrong.
- Start and finish with a Bang!
- Use PAMPERS (Projection, Articulation, Modulation, Pronunciation, Enunciation, Repetition, Speed).

Don't

- Fidget with pens or notes of jangle keys or change.
- Use repetitive words like Ok, Ok?
- Speak too quickly in order to get it over with.
- Read anything except for quotations.

Further IET reading and information

IET courses: Did you know there is a course available on Professional presentations?

Contact:

IET

PD Courses

Michael Faraday House

Six Hills Way

Stevenage

Herts

SG1 2AY

Tel: +44 (0) 1438 767337

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With thanks to:

Drumchapel Opportunities - Tim Pickles

Hugh Griffiths and Nina Thornhill. UCL

6. Final year project

Completing a project successfully is mostly a matter of planning and technique. That doesn't mean that you don't have to do any work, but rather that a good plan will make the whole process much simpler and easier.

Companies use plans routinely to improve their business practices. They do this because plans are extremely effective at ensuring that time use is maximised and therefore they get better value for money. A figure often quoted is 30%. That is 30% of time wasting can be avoided by using a plan. Saving this amount of time during the production of your final year project is a goal worth pursuing.

Most projects follow a general pattern of activities. This pattern is often called the project lifecycle.

The project lifecycle

The first part of the lifecycle is the requirements phase. This phase, for a final year project, will be the time when you are trying to understand what it is you need to do in order to successfully deliver your final year project. Towards the end of the phase you should have developed a clear appreciation of the task ahead of you and you will now start to move into the design phase.

During the design phase it is highly likely that you will need to keep returning to the requirements in order to refine them. When you are happy that you understand the requirements you will start to exit the design phase. Despite the continuing design iteration you should now feel that you are starting to know what you are required to do.

The development phase of the project is the time when the major amount of work is undertaken. This might be experimentation or in-depth research. Whatever the work, it is likely to take the longest amount of time and absorb most of your energy. However, you should not lose sight of the need to prepare to enter the final testing stages of your project output. After all if you don't release a final report then you won't pass.

To test the project you might involve friends and other students from your faculty. It is also likely that you'll now start to work more closely with your supervisor in order to complete the dissertation that normally accompanies the close of a project. When you find yourself doing this then you should recognise that you are moving into the final phases of your project.

Understanding that your project will follow this pattern makes it easier to plan for success. You will also feel less stressed and you can be confident that not only are you following a pattern familiar to many students before you, but that many companies also follow this pattern.

Building your final year project plan

Although understanding the pattern is important it will not give you the surety that you need for success. Instead, you need to translate the pattern into a more detailed project plan. The simplest way to build a plan for your project plan is by blocking up the general task pattern onto a grid.

Create a chart that presents an overview or macro plan of the whole project. Each task shows its relation to the other project tasks, its duration and when it is scheduled to start. Along the bottom of the chart run a timeline (from left to right) and on the vertical left hand axis is a list of tasks.

The first task at the left hand axis is the requirements phase task. This task along with the design phase task is scheduled to take about 2 months to complete. The plan then allows 3 months of development work and 1 month of testing. Finally, 2 weeks are left at the end for the production of the final deliverable, often the project dissertation. Although this is a good starting point, obviously the plan needs to be adjusted to fit with your own project. To do this you first need to work on the detail for the requirements phase task. You need to determine what you think you are going to do to complete the project requirements. Once you think you know what this work is then you need to work out how long the work will take.

Create a list of tasks that need to be done

Building a simple list of tasks enables you to work this out.

Make a table that shows a list of tasks that need to be completed and also includes estimates for how long these tasks will take. The estimates are given in three categories for each task: Best Case (BC), Most Likely Case (MLC) and Worst Case (WC). Normally a company would apply a mathematical model to these three estimates to obtain a single value. This model would weight each estimate depending on probability of success.

Although you could adopt a similar technique it is probably not needed. Instead, simply use the estimates as a method to make you think through how long it will take to complete a given task.

Validating your plan

Once you have the plan in detail for the requirements phase tasks, it is important that you validate the plan. Often people undertaking projects forget that much of the work they are about to do has been undertaken before by others and that by simply looking at what happened they can learn quickly where they might have gotten estimates wrong. So, to really improve your chances of producing an accurate plan it is wise to undertake some simple validation research.]

Validation research falls into two broad categories: desk research and interview research. Desk research involves using books and the Internet to find relevant information. Interviews simply involve asking people who have undertaken similar work before.

If this idea of research seems excessive for a final year project then it is worthwhile remembering that companies do it for almost every project they carry out. One of the most commonly asked questions is, 'What happened last time we did this?'. Historical data mining is big business for companies because it avoids them wasting precious time that could be spent doing other things.

If you've followed the process so far you should now be in possession of a basic plan of action. The next obvious thing to do is to move onto planning the design phase. However, you don't need to do this. Providing you are reasonably happy with the blocked out time for the design phase you can hold off planning it until some of the requirements phase is completed.

Why would you delay planning?

Holding off planning like this is a common technique used by professional project mangers. They recognise that before the requirements are understood it is very difficult to guess at any other project activities. Experience shows them that actually all that happens is that they waste time planning activities that will ultimately need to be replanned.

However, this doesn't mean that you don't need to plan the design phase. Instead, it simply means delaying the planning until you reach a suitable point in the requirements phase. This point should be reasonably obvious but if in doubt start the planning when you are two thirds of the way through the requirements phase. Similarly, towards the end of the design phase you must plan the development phase in detail and, as it completes, plan the test phase.

Finally, you need to remember that as time goes by you need to iterate your plan. Put simply, your plan must become a living document. It is not something to do once to keep a tutor happy. It is important that you review your progress against it every time you work on your project. If you do then things should go well. Although planning can't guarantee you a good mark, it can make getting there easier and surer. You can be confident of finishing and be confident of doing the right things along the way.

Good luck!

Alan Orr is a Chartered Engineer who has worked as a project manager with Blue Chip companies such as British Airways, Samsung, Nokia and Aerospatiale. He is now the Director of Engineering at Picsel Technologies Ltd.

7. A code of honesty

When writing your final year project or research report you need to present evidence in support of your argument. Jane Fitzpatrick points us in the right direction, steering clear of the perils of plagiarism.

Presenting the evidence for your final year project takes the form of citing your sources, which will add weight to your discussion. Drawing on others' work as you develop your ideas can be a stimulating and rewarding experience, however, the underlying principle is to acknowledge the work of others. Citations also point the reader to other sources (Hamilton, 2003).

Remember the work you are presenting for assessment is designed to enable you to demonstrate how you have developed your ideas within the field of study.

Citations therefore enable you to show how you have analysed and acknowledged the ideas present in the literature. They serve to strengthen your argument and support your efforts in presenting a coherent discussion (Harris, 2002).

However, failure to acknowledge sources constitutes plagiarism. This is 'to take someone else's words or ideas and present them as your own without proper acknowledgement.' (Marshall and Rowland, 1998).

A code of honesty underpins the recommendations for preventing plagiarism. As the study skills guide from the University of the West of England (2003) argues, the offence of plagiarism is considered academic dishonesty and it has serious repercussions for the perpetrator.

Plagiarism 'can be inadvertent (unintentional) or deliberate' (UNISA, 2003:2). However, the onus is on you as the writer to ensure that plagiarism does not occur. Plagiarism constitutes an assessment offence, which if proven can have significant consequences for you in achieving your award.

The outcome of an accusation of plagiarism will depend on the form it has taken and the degree to which it extends.

By degree

There are several forms of plagiarism including:

- Using published ideas as one's own.
- Representing excerpts or images from books, journals or papers published on the Web as one's own work.
- Copying the work of another student or another person and presenting it as one's own.
- Collaborating inappropriately with another student when the assignment requires individual work.
- Resubmitting substantive excerpts of your own work from other assignments as a new piece of work.

Plagiarism can occur in a small section or sections of a piece of work through to the whole of an assignment. Whatever the extent it is a serious offence.

How can you ensure that you do not commit plagiarism?

It can prove difficult remembering where you read about an idea. You may have taken copious notes in class, read numerous books or scanned the Web, and it may be difficult to distinguish the source of your thoughts.

In addition, you can sometimes genuinely think that the idea is your own. A question you can ask yourself is, 'Is there such a thing as original thought?'. Someone somewhere is likely to have thought of something at least similar before.

When writing up your final year project, as a rule of thumb, you might consider if there is likely to be a source that will compliment your discussion in some way. The important thing is to locate the source and acknowledge the original author in your text.

You can present evidence to support your points in several ways: quoting directly from another source; paraphrasing; summarising; reproducing a diagram, image or artwork.

In your write up, you must acknowledge the sources using the reference system advocated by the institution with which you are studying (UNISA, 2003).

Am I likely to be found out if I do not acknowledge my sources?

Currently, there is a purge on plagiarism in educational circles. The Quality Assurance Agency (QAA, 2000) calls for academic institutions to demonstrate that they are not allowing students to cheat in the assessment process. This includes ensuring that students are referencing their material appropriately and acknowledging the sources of their ideas.

There is a range of initiatives designed to detect plagiarism ranging from tutors reading your work and realising your text seems very familiar through to the development of very sophisticated technology, which can detect similarities with existing texts.

The message is that academic institutions are getting very tough on plagiarism offences and are likely to find and sanction offenders.

Penalties for plagiarism

Plagiarism is considered a serious offence, whether it is intentional or unintentional. The penalty for failure to cite sources accurately can be devastating.

Depending on the extent of the offence and the policies of the academic institution this can range from grading the paper as zero to failing a course. The consequence may be that the student will not be able to complete their degree.

For some this also means that they cannot gain their professional qualification.

Responsibility for accurate citations

As Creme and Lee (2003) observe, plagiarism is not straightforward. For example, in seminars students talk over issues with lecturers who may be citing their own work or the work of others. Whose work then is the emerging idea? The onus is on you as the student to make sure that you have cited your sources accurately.

With the advent of the Internet and electronic databases it is all too easy for one to highlight text and cut and paste it into an assignment. It is unlikely, however, that material used in this way will meet the exact brief of your assignment.

The style of presentation, for example, is likely to give it away. When you are incorporating material into your text think about the message that is being conveyed in the piece and present it in a way that adds to your argument.

By citing the source you also indicate to the reader that you have read around the topic and have thought about how the idea contributes to the point you are making in your own work.

Top tips for avoiding plagiarism

- Keep a notebook handy. When you come across an interesting point make a note of it. Include the author and/or editor, date, page number, journal, article title, book and chapter title and publisher. Don't use extensive quotes; think about paraphrasing or summarising points in your own words in support of your argument, and always cite the original source. Use a thesaurus as a word prompt when paraphrasing or summarising points.
- When downloading material from the Internet make sure you make a note of the source.
- Always make sure you cite all your sources.
- Contact your personal tutor or study skills advisor to find out ways of making your arguments and supporting them from the published material.
- Have confidence in yourself and develop your skills in making the argument in your own words with support from the literature.
- Leave yourself thinking time for the assignment so that you are not tempted to take shortcuts.
- Remember, if you are tempted to use another person's work inappropriately, or your own from another assignment, without accurate citation you are risking your career.

Many academic institutions now have study skills programmes available. It is worth considering if you need to sign up for one. Often they can help you to think about how you can present material and help you to develop your confidence in writing and using citations competently so that your chance of plagiarising work is avoided.

References

Hamilton College Writing Center (2003) Using Sources

Harris, R. (2002) Anti-Plagiarism Strategies for Research Papers

Quality Assurance Agency (2000) Code of Practice on Assessment

University of South Australia (UNISA) (2003)

University of the West of England (2003) Plagiarism

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Creme, P. and Lee, M.R. (2003) 2nd edition. Writing at University: a Guide for Students, Maidenhead: Open University Press Marshall, L. & Rowland, F. (1998), A Guide to Learning Independently, 3rd Edition, Addison Wesley Longman, Melbourne Source: HERO : The official online gateway to Higher Education and Research in the UK.

8. Writing reports

Most people find report writing a difficult task. The purpose of a report is to communicate ideas or information to the reader.

The ability to write a report clearly and in a form that is easy to understand is undoubtedly one of the most important skills an engineer can acquire. These days it is expected that engineers will be IT literate and competent in wordprocessing packages, spreadsheets and presentations. We have outlined some advice below for when you come to writing your final year project report.

"The report must meet the needs of the readers and answer the questions in their minds.

The report must be at the right level for the readers. Some readers have an in-depth knowledge of the subject; others may be decision-makers without specialised technical knowledge.

The report must have a clear, logical structure - with clear sign-posting to show where ideas are leading.

The report must not make assumptions about the readers' understanding. All writers need to apply the 'so what'

test and need to explain why something is a good idea.

The report must give a good first impression. Presentation is very important.

All reports must be written in good English - using short sentences and with correct grammar and spelling."

Before your research

Use structure headings as a plan and note research information under these headings on separate pages. Write a sentence or thesis statement clarifying the subject and purpose of the report which could be used later.

Writing the draft

- Keep your audience in mind.
- If you have planned headings, some sections of the report can be written before your research is completed.
- Leave the checking of spelling, punctuation and grammar to the editing stage.

When you are hard pressed, it can be easy to forget the first rule of writing which is to take time for planning and preparation. As with most things, planning is an essential part of writing your report.

A general rule of thumb is to allow up to a third of your available time on an outline, plan or a mind map. It will save hours later and is really helpful if you get writers block. Take a sheet of paper and make notes of all your thoughts and association with the subject at hand. This will give you a visual image of everything you need to include and will help you to prioritise the topics so that you emphasise the right issues. Your result will be a focused and organised report that has a clear structure and is easy to read.

It is a good idea to plan the structure of your report quite early on in the course of your project and where appropriate to write draft versions of certain sections of the project so you can slot them in to the report structure as you complete a task. By organising yourself in such a way you will help to maximise the amount of time you have available to complete the work and minimise the amount of work you have to do at the end of your project and avoid rushing at the last minute.

Objectives

- What do I want to achieve?
- Who am I writing for?
- What do they already know?
- What will be helpful to them?
- What do I want them to understand or agree with?

Is the information included necessary and does it support my key points?

It is also worth checking with your course tutor whether there are any university specific guidelines on the way they want you to write a report as this could be quite specific to your course and to the university.

The structure of a typical report is as follows:

- Title page.
- Abstract.
- Contents page.
- Introduction.
- Report of work done/methods.
- Results.
- Discussion/Analysis of results.
- Conclusions.
- Recommendations/future work.
- References.
- Bibliography.
- Appendices.
- Acknowledgements.

Title Page

The function of a title page is to win the attention of the reader. If you have a choice on your layout, you can achieve prominence for certain information such as the author's name and title by considering:

- The position on the page.
- The area allocated to the information.
- The size of the font used.
- Titles, where possible should be short and create an impact by telling the reader exactly the subject of the report.

The abstract (or executive summary)

This is an important part of the document as it allows the reader to understand and see at a glance what the nature of your report is, rather than having to read the whole document. You should aim to keep this to a maximum of one page and summarise the objectives and achievements of your project. Try to give hard facts and figures, focus attentions on the conclusions of the report, help the reader remember what is in the report.

The contents page

This should be a list of the chapter and sections you have covered together with a page index. The most helpful reports have sections or chapters with succinct but meaningful headings. This section is best addressed once the document is complete

Introduction

The introduction should set the scene of the report for example, what is under investigation, why is it important, how have others approached a similar problem; why are their approaches not suitable to this particular case, what are the aims of this investigation?

Project methodology

This should contain a detailed description of what methods were used to approach your project. However many sections you include, make sure they are prioritised, have clear headings to help the reader and there is a clear idea contained in every paragraph. Things you should consider documenting are:

- What equipment and software were used.
- What were the operating conditions.
- What assumptions have been made, if applicable.
- What statistical techniques have been used.
- Can their validity be justified.

The approach you should take in this section should be documenting in such a way so that the reader could repeat the experiment if required. For each idea presented, you should establish some rationale or motivation for its undertaking and any assumptions must be justified.

Results

Any results you present should be complete but manageable, try not to get too swamped down with unnecessary or irrelevant details - these can be saved for appendices. Results are there purely to support the argument and should be presented/ summarised in a table or graph.

Discussion and analysis of results

This is the crux of a report and the part that could help you clinch your degree. This section should attempt to explain the results in terms of theory and the findings of others and links the original question to the conclusion through the arguments that are made.

- What are the implications of the data?
- What conclusions can be drawn?
- What recommendations for changing future practice can be made?

Conclusions

"conclusions must conclude, not summarise!"

This can often be the most difficult section to write. There should be no new arguments or evidence presented here and the conclusion should be specific and directly relate back to the question you were trying to answer at the start of your project. The conclusion should quite simply be a list of points we know as a result of having done the project that we did not know when we started.

Recommendations

Recommendations should be clear and little more than checklist with references back to previous sections should the reader require more information.

Recommendations can represent ideas for good practice and also identify further research and development work, which may be required in order to clarify certain issues or move into a new phase of the project.

References

Most of the work we do builds on the ideas and efforts of others and therefore it is important to give credit where it is due by citing their papers and references.

There are defined conventions for specifying references in reports that make it easy for a reader to locate the reference.

For journal papers and books you could use the Harvard standard (see download menu) cited at the University of Ulster and for the citation of electronic web sites go to APA online (for link see right menu).

Bibliography

You may wonder what the difference between this and the references section is? Well, whilst the references section details specific texts relevant to the argument or point of interest being made, the bibliography should detail a list of general reading in the subject area of interest. Bibliographies are normally listed in much the same way as the references.

Appendices

Any supplementary or detailed information that could interfere with the continuity of the main body of the document should be left for the appendices - therefore allowing the reader to concentrate on the subject manner in hand without distraction. Appendices should be numbered accordingly for example, Appendix A1, Appendix A2 etc – in order to allow cross-referencing from the text.

Acknowledgements

If other people's results or ideas are quoted or used in the text, then they should be referenced by citations. However any significant help received should be acknowledged in this section: Things that are normally noted include:

- Useful/ stimulating/ helpful discussions with someone.
- Financial support for the project.
- The loan of equipment.
- The processing of data by specialist software.
- Acknowledgements are normally restricted to those outside your organisation.

Style for readability

Top tips

- Avoid long sentences.
- Remember, the sentence length should be flexible, to allow text to flow.
- Long, unfamiliar words reduce clarity - Good business English is clear, simple, familiar to readers and definite. Don't be tempted to use obscure and convoluted grammatical constructions as this could put the reader off.
- Avoid unnecessary words.
- Avoid turning verbs into nouns or names i.e. Nominalisation.
- Use the active rather than the passive voice.
- Use the personal construction rather than the impersonal.

Finally, remember to always make back-ups of your work as you go along. You should work in confident expectation that:

- Your hard disk could fail.
- You could accidentally delete vital information.
- Your computer could be stolen.

9. Making time

It doesn't matter how hard you try, sometimes it feels like there just aren't enough hours in the day. Of course, during your final year of education, when you have masses of work to do in the form of your final project, you'll be feeling this more than ever.

Poor time management has been known to be a factor for poorly graded or even failing projects and so use of time management tools is the key to success.

We have outlined some advice below on how to best deal out time when it comes to busy periods such as this. Take a look at the different advice we've given you for different situations. You'll also find these tools useful in all areas of life, and in the busy work environment of an engineer, you'll find that time management tools never stop being useful.

Assessment of your current situation

Firstly, you can look at the areas where you can improve your time managing abilities. Over a typical week, keep a time log, recording what you are doing every 15 minutes. Compare the log with what you would like to be doing to get your goals achieved - and be honest about this.

Then it's time to work out the reasons for any mismatch, being realistic about your own contribution to the situation; typical causes might be interruptions, too much time getting sucked into peripheral tasks such as IT problems, spending too much time talking to other members of your team and allowing them to take up too much of your time.

Preparation and organisation

Now find simple ways to help structure your time. Simple things like using your biological rhythm to your advantage will help you achieve more in the average day. Perhaps your energy levels are higher in the morning - you'll probably find you do the most work then, so plan around that.

Spending time getting organised now will save time in the long run. Firstly start to use a personal organiser, allocating pages for monthly reminders, weekly priorities and daily 'To do' lists.

There are many different areas where you can easily make more time for yourself, and use your time more wisely. Simply by following some of the pointers below, you'll begin to find that you are able to spend more time concentrating on things that are important to you.

- Keep a tidy desk.
- Be conscious of time.
- Have a daily 'To do' list.
- Delegate work.
- Say No to jobs that aren't yours.
- Close your door and open it selectively.
- Be assertive.
- Set realistic deadlines - don't try to over achieve as this will add to your stress levels and leave you achieving less!
- Give yourself private time.

Dealing with interruptions

Of course, during any day you'll be faced with interruptions; from tutors, teammates, friends and family. Perhaps you worry about coming across as rude, but when time is as important to you as it right now, you have to lay down the law, and make sure your time isn't wasted. As you can see by some of the advice below, using some simple aspects of body language will make people aware that you're busy, and will make them more likely to discuss what they need to quickly, then get back to their own work and leave you to yours.

- Ask why they have come.
- Stand when they come in.
- Be ruthless with time and gracious with people.
- Suggest a later meeting.
- Meet in their office.
- Perch on the edge of the desk.
- Save small talk for the pub.

Overcoming blocks

When it comes down to the nitty gritty, there are going to be stages when you've just had enough and you begin to face blocks. You will get through them, but to do that sooner rather than later here's some handy tips.

- Do the nasty jobs as soon as possible and reward yourself afterwards.
- For larger challenges, break the task down into smaller pieces which can be tackled one by one.
- Separately thinking from doing by producing a list then working through it.
- Focus on how good it will be when the job is done, rather than on the difficulty of the task.

Meetings

Whilst working on your final project and also any other work you may be undertaking over the final year, you'll find that some of your time gets eaten up in meetings. Simple pointers can make meetings concise, helpful and above all else - short!

- Don't waste others' time.
- Plan the meeting - have a clear agenda, circulated beforehand.
- Don't allow interruptions.
- Produce a summary of decisions and actions, with owners/ dates.
- If you are invited to a meeting, understand why you need to be there and what is expected of you - consider attending for only the relevant part if possible.

The telephone

These days you're likely to have a phone with you or beside you at all times, and when you're not in the mood for working, it can be a great time wasting tool! Use this advice to make the most of your phone - in all the right ways.

- Write down key points to be raised.
- Be aware of time passing.
- Unplug your phone or install an answering machine when its time for serious head-down work. Return calls when it is convenient for you, perhaps when you're taking a break later in the day.

Email

Email can be just as bad as the telephone. They can be very time consuming, so use this advice wisely:

- Turn off the audible warning for incoming mail.
- Familiarise yourself with the facilities for managing email and use them (filing and back-up, filtering, circulation lists etc).
- Devise a code of conduct for email in your area to minimise unnecessary email traffic, especially attachments.

Balance

The most common time management mistake that people make is not allowing for a balanced life style. Yes this final project is very important to you, but it isn't 'Your Life'. Overall, you won't do well, if you neglect other areas of your life. There are six important life areas that you need to dedicate time to:

- Physical - exercise, nutrition, sleep.
- Intellectual - cultural, aesthetic.
- Social - intimate and social relationships.
- Career - school an career goal directed work.
- Emotional - expression of feelings, desires.
- Spiritual - quest for meaning.

You certainly don't have to set aside dedicated time for each area, however if you notice one area that you don't attend to at all, you may be ignoring an important part of yourself. Missing out on exercise may lower your energy levels for example.

The project itself

Although the above advice will help you manage time better, here are some specifics to help you work your way through your final project. Firstly, don't wait until you have done all of the reading before you start writing. You'll find life easier if you start drafting out your first chapter once you have done some initial research into the area.

Again it is best to make yourself a timescale with realistic plans in it e.g. one chapter of 1500 words per week. Stick to this and you won't be bogged down with work, or running behind towards the end of the project. Reward yourself for each section completed, so you get something to look forward to and ease the pressure a little by allowing yourself some 'slippage' points.

One word of advice - survey work such as questionnaires always takes longer than expected. Remember that data collection can be quick but good data analysis takes a lot longer and will typically involve computer analysis, so keep that in mind. Also, if your survey work, case study etc. is only one chapter within the whole, then keep it within reasonable proportions. The time spent in chasing 10 extra questionnaires might be better deployed refining your theoretical sections or adding to your literature review.

When it comes to contacts, don't just wait to find out that a busy organisation does not have time to respond to your requests for information, interviews and so on. Get on with the rest of the project with a contingency plan in case you cannot do what was originally intended.

Also don't panic if things start to go wrong e.g. you cannot get vital data. Your tutor can (sometimes!) help you rescue and turn around seemingly desperate situations, and panicking will only make the situation worse.

One great time saving tool is to make sure you collect all of your references together as you go

Disciplined use of good Harvard Referencing techniques in your own little database/spreadsheet/card indexes will pay dividends. Better still; keep your list of references 'current' by stitching in references as you go.

Once you've written the project you're on the final stretch. It's not completely over yet though, so allow plenty of time for a final proof-reading e.g. a week! Many final year projects can be jeopardised by being rushed towards the end. In addition, good presentation may not gain you marks but poor presentation may certainly lose some. Do not spend a lot of time on fancy presentation if you have glaring errors of spelling or grammatical constructions within the project.

Finally, time spent on constructing a good contents page (detailing page numbers for each chapter and section) pays great dividends in adding to the professional feel of the whole. This often has to be a 'last minute' job i.e. you need to know what the page numbers actually are before you can write the page numbers into your List of Contents section (you do not have to number these!)

With thanks to:

Final-Year-Projects.com

The University of Illinois

10. Log books

Your final project may be the first time you need to use an engineer's log book, however it won't be the last. So with that in mind, now is the time to master using it correctly.

You'll come to find that the role of the log book is more important that you originally thought, as it plays an integral role in documenting your project.

One of the main ways that engineers communicate when working on a project is by careful record keeping. Good documentation is key to a successful project, and so the log book is an essential communication tool during the design and development process.

The log book serves as a tool for passing on all of your information from sketches, and design concepts to tests and schematics to all other team members. But they can also be important legal documents in certain cases, documenting your work at every stage, and proving that you were indeed the inventor if ever questioned.

In a nutshell, the engineer's logbook is a work diary and a legal document; a place to report all your project work.

It is intended to serve as a record of new ideas, research and development with its primary purpose being to serve as evidence of inventorship; including establishing the date of invention.

In order for this purpose to be possible, you must stick to a specific outline:

- Ideas, calculations, experiments, tests etc, which may have bearing on developments should all – and always - be entered into the log book.
- Entries should include problems worked on, possible and actually solutions plus calculations and tests made.
- The log book should be a bound book, loose leaf is not allowed.
- Do not leave pages blank, and do not tear any pages out.
- Photos, drawings, graphs etc should be used liberally. They must be dated and signed by your project advisor and attached to the log book using glue or staples etc.
- If a change is made, draw a line through the original entry and clearly indicate what the change is and why it was made. Initial and date it, however where possible, try to make a new entry rather than change an older one.

The most important rule to remember is this: when it comes to what you must record; simply record everything. Meetings, research, testing, writing, failures successes - the whole shebang.

In the working world, you will find that most engineers working on a project will keep a log book and once the work is completed, all the log books are collected, and placed in an archive, remaining the property of the company. This means the company has documentation of all engineering achievements that took place during the project - whether it leads to commercial use or not - also serving as a valuable legal document if the work if ever questioned on one way or another.

So welcome to the world of the log book, it is likely to be with you for the rest of your career.

Log books and final projects

Although you need to discuss with your tutors exactly what they expect from your log book when working on your final degree project, there are often similar guidelines from university to university. Below is some advice from the IET, but confirm with your tutors that this is what they expect from you and your documentation.

For starters, if working on a team project, each student must keep their own log book detailing the evolution of the project. Tutors should review the log book at regular intervals, signing the book to confirm that they have seen it.

Be aware that your tutors can request to look at your log book without any notice, so make sure you write the work you've undertaken on a daily basis. One handy hint; when you are first given your log book, start on page 5, as you can then use pages 1-4 as your index.

Use the log book as a design tool; enter everything in there, no matter how irrelevant you might think it is. Every day, put time aside to write up what you've done, detailing all your ideas, and keep a record of your successes and failures.

Keeping a detailed log book is one of the marks of a professional engineer, and your university experience will put you in good standing when it comes to approaching project documentation in your future career…

With thanks to:

Hugh Griffiths and Nina Thornhill. UCL

Iowa State University project.

11. Writing to inform and impress

Writing can seem like a chore, but unless it's clear and impressive, says Patrick Forsyth, it's a wasted opportunity. So make sure that the way your project is written and presented is the icing on the cake.

The end is in sight, and you're about to embark upon your final challenge: writing up your project.

Everything you write presents you with an opportunity. Whether you are writing a final year project, a report, proposal or business plan, a letter, memo or email – all must be clear. Any confusion, even just a slight confusion, can end up causing delay and frustration. It can waste time while things are clarified. It may result in a wrong action, or in inaction that costs money as well as time, or in losing marks on your brilliant project. At worst, an

inappropriate document can cast you in an inappropriate light, returning months afterwards to haunt you.

Get it right and the reverse is true. Good writing is truly a career skill - one that no one in business can afford to be without. It can smooth operations with its clarity and positions you as competent and authoritative. Clarity - rather than a profusion of unexplained jargon - is especially powerful, not least in technical areas. However good verbal communication may be, the written form often lags behind. Somehow writing is more difficult. People originate material that is at best pedestrian and at worst formulaic, banal or full of jargon and gobbledegook. Why?

Most often it is through a lack of thought and care. Writing takes place with an eye on the clock. Messages may be drawn from standard material (sometimes dating back years and never having been good) or it may reflect bad writing habits of a lifetime, which perhaps started with no real guidance as to what was best.

I find, when critiquing material on business writing courses, that the worst examples are rarely defended. No one says, 'You're wrong. I thought long and hard about that and I believe it is the best way to say it'; more likely they admit something is unclear or gives the wrong impression and readily seek a better turn of phrase. It is not that wrong decisions are made, rather that thought and care is inadequate as writing takes place on 'automatic pilot'.

Making it right

Good writing - of any document, long or short - starts with clear intentions. If you cannot say why you are writing, then it is unlikely that you will create something satisfactory. Writing must reflect clear intentions in four main areas:

- The message: what it is, how it can be made clear, what effect it should have on the reader, what restrictions or opportunities the form of writing reflects.
- The nature of the message: must it inform, persuade, change attitudes or motivate; or all three or more?
- The readers: what are their expectations, not only for the message but also for the written form (will they expect it to be long or short, clear, descriptive, jargon-free, etc.)?
- The image projected: what impression should it give of you? Maybe you need to appear experienced, helpful, well organised - such a list is long and you can doubtless add more.

The complexity here is clear. Many factors must be borne in mind and all demand an active approach; in other words it is not enough to be well organised – you have to appear so. And just maybe your intention is to appear better organised than you actually are!

Common mistakes

The following are all important:

- Punctuation: this must be used correctly - and there must be enough of it. Anything you cannot read out loud without running out of breath needs more punctuation.
- Simplicity: short words, short sentences and short paragraphs are to be preferred. Actually a mix of sentence length works well, and makes the text seem more manageable. Like this. It was the American writer Mark Twain who said, 'I never write 'metropolis' when I get paid the same for writing 'city''. It remains a good thought.
- Adjectives: many business documents contain far too few. If description is important - then describe. There is all the difference in the world between saying something is 'very slippery', and saying that it is 'as slippery as a freshly buttered ice-rink'. Nothing you propose is ever 'very practical'; if there is nothing better to say about it than that, forget it.
- Style: language is a powerful thing. It is more important to be clear; to put a picture in someone's mind or bring something to life, than to fit some academic vision of what 'business writing' should be like. Especially so if, as too much is, writing is replete with galimatias and sesquipedalian (that's gibberish and overly long words). So use words that work and beware of reducing impact with excessive verbiage.
- Annoying: words and phrases can annoy. I hate seeing 'at this moment in time', written rather than 'now'. Or 'due to the fact that' instead of 'because'. Words can be too new (and sound pretentious), too old (and sound oldfashioned), or too complicated (and sound inconsiderate if you are writing too much jargon for your reader's level of technicality). Choose words and phrases carefully and avoid the overused: 'user friendly' has long since become bland rather than descriptive.
- Correct: this is not the place for a treatise on grammar and syntax, but English contains many pitfalls. One example: the delightfully named tautology - unnecessary use of words that mean essentially the same thing like 'exporting overseas' or 'future planning'.

If you write in a natural style (close to how you would speak), that is well organised (with a clear structure and logical flow), and if you always keep your readers (whoever they may be) in mind, then you are more likely to impress. Remember that writing is a fragile process.

The difference a word makes

Choosing even one wrong word may confuse, annoy - or worse. The following examples are designed to show the danger:

- 'Continuous' (unbroken or uninterrupted); 'continual' (repeated or recurring) - a project might be continuous (in process all the time), but work on it likely continual (unless you never sleep).
- You might want to do something 'expeditious' (quick and efficient), but saying it is 'expedient' might not be so well regarded (meaning only that something is convenient - not always a good reason for action).
- 'Fortuitous' implies something happening accidentally; it does not mean fortunate.

No inaccurate use of language will help your case, even if it only annoys rather than confuses - as adding just one inappropriate word - very - to unique might do (unique means unlike anything else and cannot be so qualified).

Improvement and change

Improvement may demand developing new habits. One common fault is that promotional writing is 'introspective': every thought (even every paragraph or sentence) in a brochure starting with the words 'We', 'I' or 'The firm', when concentration would be better focused on the customer. Resolve to twitch every time you do this; and try to express the same thought starting with 'You' (or 'your') to help kick start a different, and more reader-oriented, style.

The written word is not transient like speech. In writing, first impressions last. Look again at some recent documents you have written. How well do they work? Be honest. Creating words with real impact – that will explain, impress and differentiate - can be a striking, low-cost way to improve business results. The effort involved will pay dividends.

Patrick Forsyth runs Touchstone Training and Consultancy. He is the author of a number of successful business books, including 'Powerful Reports and Proposals' and 'Persuasive Business Writing'.

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