NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE

Revised Edition

# HW0288

## Engineering Communication

*Student's Course Guide*

AY 2021/2022

LANGUAGE AND COMMUNICATION CENTRE
NANYANG TECHNOLOGICAL UNIVERSITY

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# HW0288 Engineering Communication

This is the revised edition of the coursebook for Engineering Communication, a one-semester, 2-credit course that builds upon the foundation course, Effective Communication. The broad aim of this course is to further enhance students' abilities in academic communication related to their studies in engineering, as well as in professional communication. Professional engineers need to be able to communicate their expertise and knowledge, both to their professional colleagues and also to the wider community. This coursebook is designed to help improve students' skills in both areas of communication. Shaped around the Final Year Project and workplace communication, this coursebook will aid students in successfully completing Engineering Communication. This revised edition has been updated to keep the content relevant for modern engineers.

Please note: As HW0188 Effective Communication is a pre-requisite for this course, please ensure that you have completed the course or obtained exemption from this requirement.


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# Contents

# Course description

## Introduction

HW0288 Engineering Communication is a one-semester, 2-credit, second-level course for students in the College of Engineering at Nanyang Technological University (NTU). Please note that HW0188 Effective Communication is a pre-requisite for this course. Thus, you should ensure that you have completed this course before registering for HW0288 or have obtained exemption from this requirement.

HW0288 is an advanced course which aims to enhance the spoken and written abilities of engineering students when communicating in both academic and professional settings. In this course, the emphasis is on advanced skills in academic and professional communication. In the academic literacy and information literacy components of the course, you will learn advanced skills for searching academic databases, evaluating sources and incorporating and citing them appropriately in your writing. In the professional communication component of the course, you will learn written and oral workplace communication skills such as writing emails, participating at meetings, interacting with clients and projecting a professional image of yourself.

This Course Guide has been prepared to guide you through the course. It contains important information on the course schedule, tutorial handouts, and assignments. Please read this guide carefully as it will help you progress through and complete the course successfully. We hope that you will enjoy this course and find it beneficial for your studies at NTU and beyond. If you have any questions related to the materials, we encourage you to contact your tutor.

## Learning objectives

The objectives of this course are to improve the writing and presentation skills of students with particular reference to the Final Year Project (FYP) report, and their communication skills in professional settings.

## Learning outcomes

Upon successful completion of this course, you will be able to:

1. apply the principles of research writing to produce an effective FYP report;
2. make effective technical presentations with reference to your FYPs and the workplace; and
3. understand the communication demands of the contemporary workplace.

## Course schedule

The schedule below sets out a week-by-week plan of the course along with information on assignment submission deadlines. To optimise class time, please read the specified unit for each tutorial before attending class as no reading time will be provided in class. Class time will be utilised for tutorial activities and group discussions.

| Week | Tutorial topic | Assignment deadlines |
|---|---|---|
| 2 | Overview of the final year project (FYP) and workplace communication | |
| 3 | FYP reports: Introduction | |
| 4 | Information literacy skills workshop | |
| 5 | FYP reports: Introduction (continued)<br>Reviewing and citing literature | |
| 6 | FYP reports: Materials and Methods | |
| 7 | FYP reports: Results and discussion | **Assignment 1**<br>Writing the introduction |
| | **Recess week** | |
| 8 | FYP reports: Conclusion and Abstract | |
| 9 | Preparing and delivering FYP reports and other technical presentations | |
| 10 | Written workplace communication: Writing emails | |
| 11 | Spoken workplace communication | |
| Online | Intercultural workplace communication | |
| 12 | In-class presentations | **Assignment 2**<br>Oral presentation of an FYP introduction |
| 13 | • In-class presentations<br>• Course review and feedback | **Assignment 2**<br>Oral presentation of an FYP introduction<br>**Assignment 3**<br>Writing emails |

Although this course has 10 units, these are spread over 12 weeks, with Week 13 including a review of all the units. The units have a common format consisting of: *Introduction*, *Learning outcomes*, *Content* (including input and activities), *List of references*, and *Appendix* (if necessary). In addition to the course materials, wherever appropriate, references to relevant books and articles dealing with topics in the individual units have been included.

## Course assessment

There is no end-of-semester examination for this course: continuous assessment will be used for student evaluation instead. This mode of assessment is particularly suited for communication courses as it takes into consideration the development of students' skills in written and oral communication through the semester. You will be assessed based on written assignments (55%), oral presentations (30%), and class participation (15%). These assignments will focus on the course objectives of demonstrating advanced skills in academic communication such as writing and presenting the FYP report, and citing sources appropriately, and writing emails in professional communication.

The assignments are as follows:

**55%: Written assignments**

- There are **two** written assignments:
  1. **Writing the introduction**: This is an individual assignment in which you write the introduction section of your tentative FYP report.
  2. **Writing emails**: This is a paired assignment in which you and your partner write an email.

**30%: Oral presentation**

- You will present the introduction you have written in Assignment 1.

**15%: Class participation**

- The tutorials will be conducted as workshops focusing on written and oral communication skills. To encourage you to participate actively in tutorials you will be evaluated for the quality and quantity of your contributions to classroom tasks.

The table below provides a detailed breakdown of the course assignments and weighting:

| Assignment | Word limit/Duration | Type | Weighting |
|---|---|---|---|
| **Assignment 1:** Writing an introduction | **500 words** | Individual | **30%** |
| **Assignment 2:** Oral presentation of an introduction | **5 minutes** | Individual | **30%** |
| **Assignment 3:** Writing emails | **300 words** | Paired | **25%** |
| Class participation | **Weeks 2 - 13** | Individual | **15%** |
| **Total** | | | **100%** |

The instructions and guidelines for each course assignment along with submission details are included in the **Course assignments** folder on the main NTULearn course site. You are required to submit your written assignments through Turnitin, which is a plagiarism detection system.

The materials have been designed to enable you to communicate effectively in academic settings, using internationally acceptable standards of English in terms of structure, style, and expression. We hope that you will find this course interesting and that you will be able to use the knowledge and skills learnt in the course in your discipline as well as the workplace.

# Unit 1

## Overview of the final year project (FYP) and workplace communication

## Introduction

This introductory unit gives an overview of the two major topics covered by this course, namely (i) writing the final year report, and (ii) workplace communication. Units 2-7 will prepare you to meet the challenges of writing your final year report in your last year of studies and Units 8-10 will prepare you to communicate effectively in the workplace when you graduate.

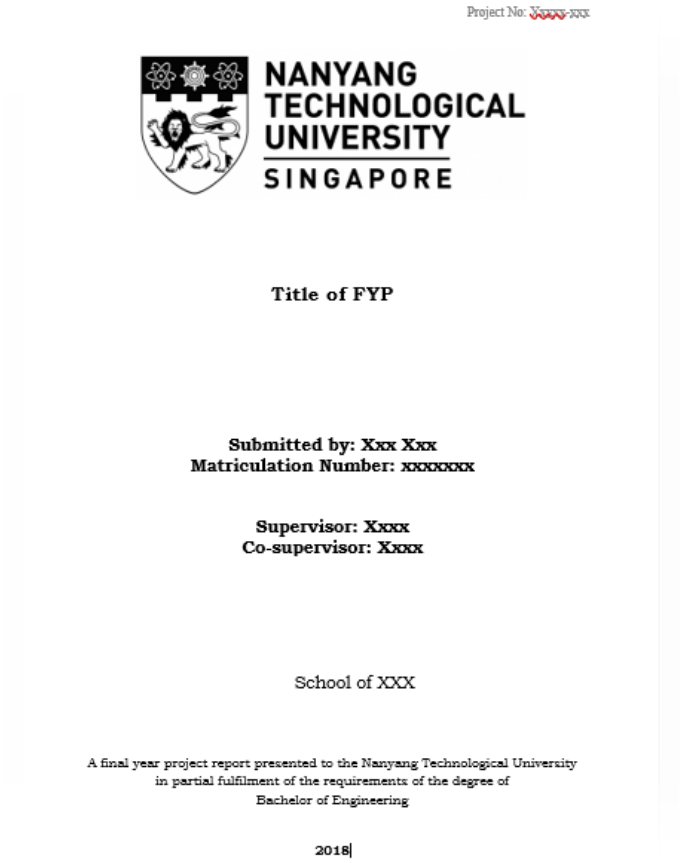
## Learning outcomes

After completing this unit, you should be able to:

1. understand the purpose, requirements and expectations of the final year report;
2. identify the specific writing skills required for writing your final year report;
3. understand the expectations of potential employers with regard to communication skills; and
4. assess your current level of written and oral competence in academic and workplace communication.

## Overview of the Final Year Project (FYP)

In their final year, College of Engineering students are required to complete a research project (the FYP) and write it up as their final year report to be awarded an honours degree. Figure 1.1 shows a sample cover page of an FYP report. However, you need to take note that different schools have different requirements for the cover page, format, reference style, and so on. Please read carefully and follow strictly the specific instructions given by your school.


Project No: Xxxx-xxx

NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE

**Title of FYP**

**Submitted by: Xxx Xxx**
**Matriculation Number: xxxxxxx**

**Supervisor: Xxxx**
**Co-supervisor: Xxxx**

School of XXX

A final year project report presented to the Nanyang Technological University
in partial fulfilment of the requirements of the degree of
Bachelor of Engineering

2018

Figure 1.1: Cover page of an FYP report

# Activity 1.1
## Understanding the purpose of the FYP

Many universities in addition to NTU require students to complete a research project in the final year of their studies. What do you think is the purpose of the FYP?

Share your response to the question above with your group members. Summarise the group's responses for the class.

# Activity 1.2
## Listening to advice on writing and presenting the FYP

### Video activity

Listen to an interview in which an NTU professor talks about his experience supervising and examining students' final year projects. As you listen, make notes on what he says are the common mistakes made by students when writing and presenting their final year projects and the advice he gives.


Video [1:00-3:00] - Interview with Associate Professor Lee Yong Tsui on written communication

| | |
|---|---|
| **Common mistakes made by students when writing their final year reports** | |
| **Advice on writing the final year report** | |


Video [3:00-5:00] - Interview with Associate Professor Lee Yong Tsui on spoken communication.

| | |
|---|---|
| **Common mistakes made by students when presenting their final year reports** | |
| **Advice on presenting the final year report** | |

Share the notes you have made on writing and presenting the final year report with your group members. With your group members, compile a list of do's and don'ts for writing and presenting the final year report and share your list with the class.

## Activity 1.3
### Reflecting on the challenges of the FYP

Following from the previous discussion, what are the challenges you personally will face in undertaking the final year project? Write down 2 or 3 of them and also what steps you will take to overcome them. Share your thoughts with other students.

## Overview of workplace communication

In HW0188- Engineering Communication I, you have learnt about the basic documents that engineers write – such as proposals and reports – as well as how to prepare and deliver a technical presentation. In Units 8-10, you will learn about other important communication skills such as participating in meetings, interacting with clients, and writing emails. These skills are essential for a professional engineer to work effectively.

## Activity 1.4
### Comparing everyday communication and workplace communication

Discuss with your group the following questions:

1. In what ways do you think workplace communication is different from the communication we engage in with friends and family?
2. How do these differences affect the way we speak and write?

3. Why do you think it is important that we understand the differences between workplace and everyday communication?

Be prepared to share your group's responses with the class.

## Activity 1.5
### Identifying the attributes and skills of a 21st century professional

**Video activity [1]**

Imagine you are writing your own testimonial for a job you are applying for. List the attributes (personal qualities) and skills that you would include in the testimonial. Read your list to your group members. Identify the attributes and skills that are mentioned most in your group.

Now watch the video on 21st century skills to find out if the attributes and skills you have written about yourself are reflected in the video.


https://www.youtube.com/watch?v=qwJIhZcAd0I (2:07)

Would you add any skills to your list after watching the video? What are they? Why?

## Activity 1.6
### Assessing your workplace communication skills

Rate your current level of competence in each of the areas listed below, with 3 being excellent and 1 being in need of improvement.

| Type of skills | Your ranking |
|---|---|
| Writing Skills | |
| Presentation Skills | |
| Conversational Skills | |
| Persuasive Skills | |
| Critical Thinking Skills | |
| Collaboration Skills | |

The following are the results of a survey conducted by the Language and Communication Centre and the Career and Attachment Office in NTU to find out prospective employers' views of the communication competencies of new hires.

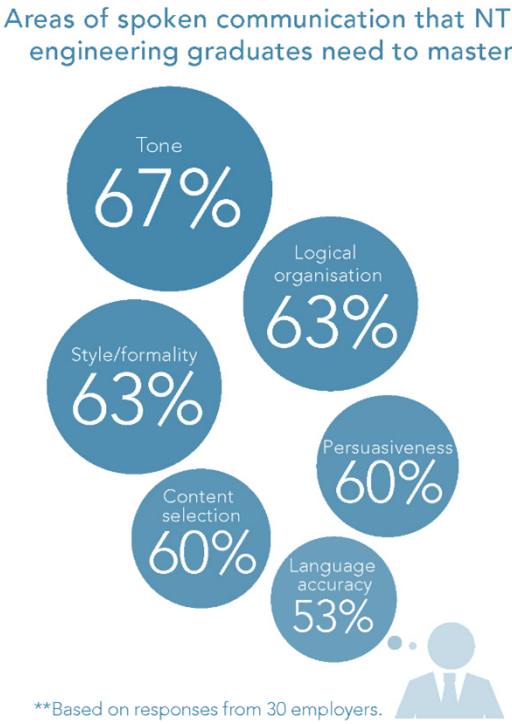



Figure 1.2a: Areas of spoken communication that NTU engineering graduates need to master

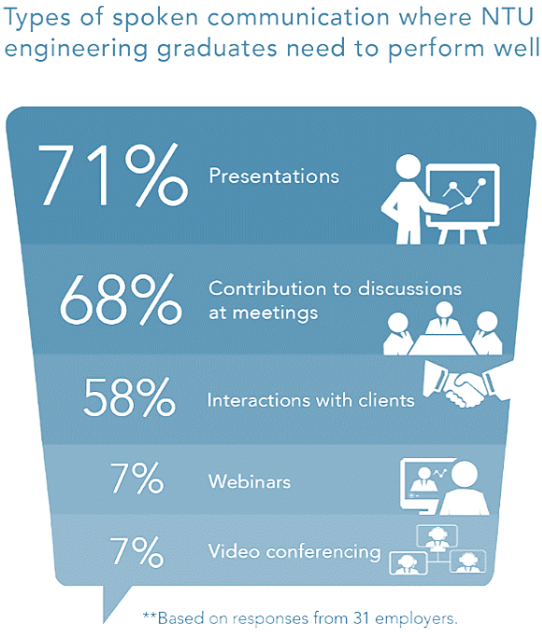



Figure 1.2b: Types of spoken communication where NTU engineering graduates need to perform well

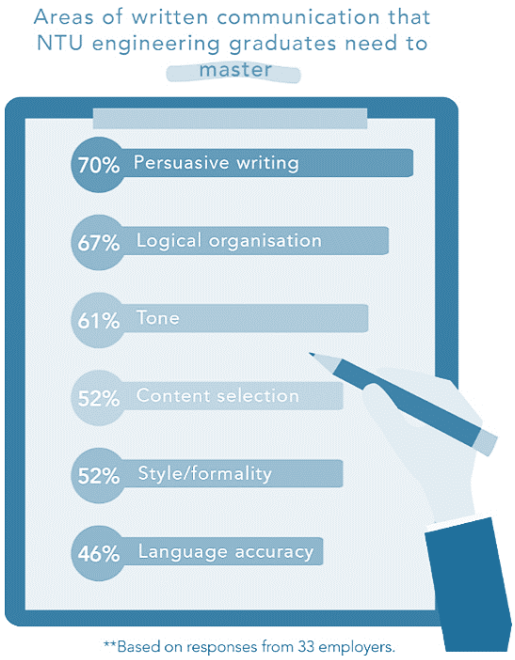



Figure 1.2c: Areas of written communication that NTU engineering graduates need to master

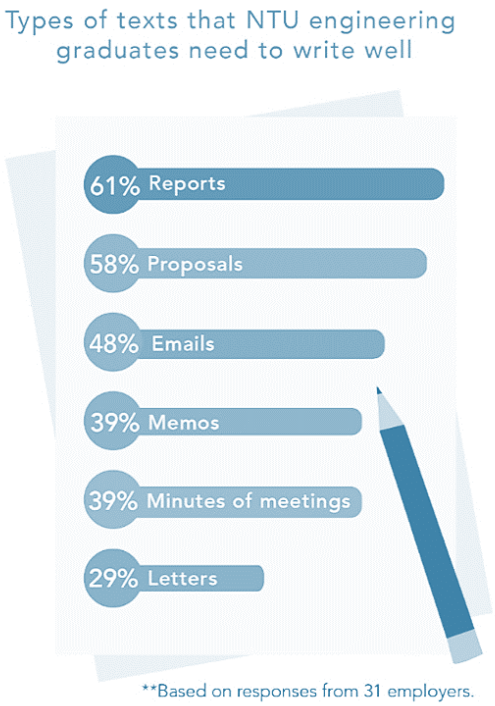



Figure 1.2d: Types of texts that NTU engineering graduates need to write well

Consider your assessment of your current communication skills against the findings from the employers' survey. How well did you do?

## Activity 1.7
### Determining the areas for personal improvement

In the table below, list the areas that you will work on to improve your communication skills to be successful in the workplace. Share your list with your group.

| Areas | Remarks |
| --- | --- |
| | |
| | |
| | |
| | |
| | |
| | |

## Summary

In this unit, you have learnt about the purpose, expectations, and requirements of the final year project as well as the writing and presentation skills that are required for successful completion of the project. You have also learnt about how workplace communication is different from everyday communication, and you have evaluated your current communication skills with reference to employers' expectations of the communicative competence of new recruits.

## Preparing for Unit 2

The next tutorial is on writing the introduction to a research report. Please read this unit before class as the tutorial will focus on classroom activities. Also, read the introductions in the two reference articles, namely, 'Gold nanoparticles for cancer detection and treatment: The role of adhesion' and 'Analysis of all-terrain vehicle crash mechanisms'. These articles are available on the main NTULearn course site. There will be no class time given for reading.

## Reference

[1] Bilisim Teknolojileri. "21st century skills," *YouTube*, Mar. 22, 2013 [Video file]. Available: https://www.youtube.com/watch?v=qwJIhZcAd0I. [Accessed: May 30, 2018].

# Unit 2

## FYP reports: Introduction

## Introduction

Engineering FYP reports usually begin with an introduction that provides a general background to the project, and outlines its aims or objectives. A good introduction explains why your project is worth doing and describes what you intend to investigate. It is important to write your introduction well to give a positive impression of yourself as a good engineering student.

## Learning outcomes

After completing this unit, you should be able to:

1. identify the information components in an introduction;
2. organise information components logically in an introduction;
3. apply language conventions typically used in an introduction; and
4. write an introduction with an appropriate background, objective, and scope.

## The structure of an FYP report

We can classify engineering FYPs into two main types:

- 'research-style' projects that study or investigate an issue or problem; and
- projects with a 'deliverable', i.e., projects in which you design or develop something.

The material in this course guide is based on a highly influential model of a research report derived from Swales [1], and applies directly to the first type of FYPs, i.e., 'research-style' projects. In this model, the report typically has the following chapters or sections:

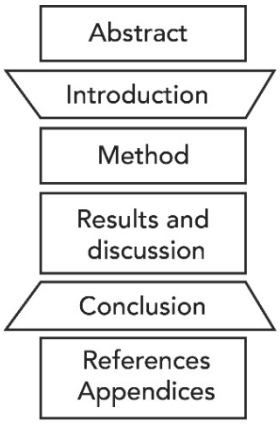



Figure 2.1a: Structure of a research report [1]

Reports for the second type of FYPs (i.e., projects with a 'deliverable') generally follow a similar structure:

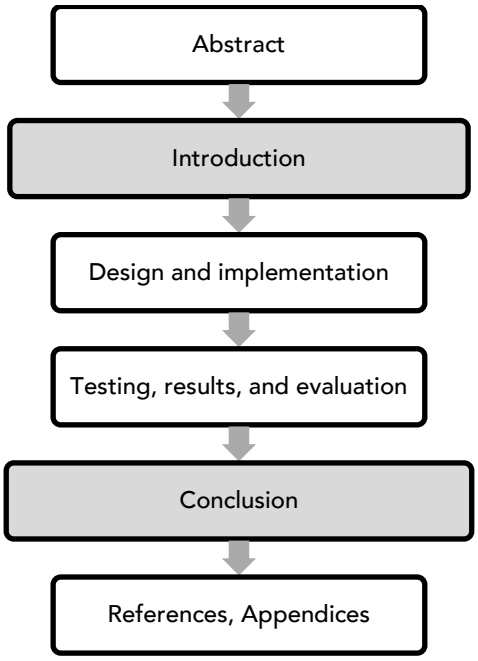


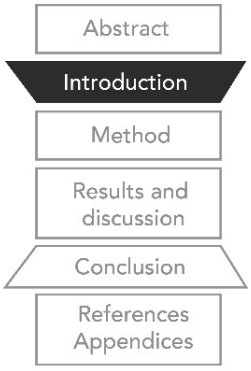

Figure 2.1b: Structure of a report for a project with a 'deliverable'

In place of the 'Methods' chapter or section of the research report are a few chapters or sections describing the design and implementation of the 'deliverable', while 'Testing, results and evaluation' is similar to 'Results and discussion' in the research report. The principles for writing the 'Design and implementation' and 'Testing, results and evaluation' chapters or sections of a deliverable-type FYP report are similar to those for the 'Methods' and 'Results and discussion' chapters or sections of a research report respectively.

Note that there are variations in the chapters or sections comprising 'Design and implementation'. These variations depend on the engineering discipline you belong to, and on the type of deliverable that you are developing. Additionally, while research reports should typically focus much more on 'Results and discussion' than 'Methods', reports for deliverable-type FYPs should focus largely on 'Design and implementation', with 'Testing, results and evaluation' usually forming a relatively short chapter or section.

The other chapters or sections are similar for reports on both types of FYPs.

## Information components in an introduction




The content in an Introduction comprises three typical components:

**Component 1**: Giving background information about your topic

**Component 2**: Establishing the importance of your study

**Component 3**: Introducing your study

Figure 2.2: Structure of a research report – Introduction [1]

### Component 1: Giving background information

Component 1 provides the space for you to introduce your research topic in general. It also helps to orientate your audience to the specific area you have chosen in a particular field. By showing that the research area is important or interesting and by demonstrating your familiarity with the research topic, you establish your credibility as a writer.

There are many ways to introduce your research topic but typical strategies include providing historical information, stating facts, defining terms, and reviewing previous research.

The 'funnel approach' (general to specific) is usually employed in organising information in the introduction section. It is important to remember that your ideas should progress from the general and the familiar – the starting place of your project in the everyday world – to the specific and technical – the starting place of your project in the laboratory or field.

**Example of Component 1: Giving background information**

The clothing worn for exercise is just as important as drinking water when exercising. Why is that so? There are several different types of sportswear in the market and each has its own unique properties depending on the material composition. Therefore, it is important to decide on the right material for the right activity. In many intense sports, the most common injury faced by athletes is heat injury. A study was conducted between March 2007 to November 2013 in Tel Aviv, Israel, to determine the percentage of life threatening-events during endurance races that are due to heat stroke or cardiac causes. [1]. The results of the study showed that out of the 137,580 runners that participated in long distance races during the study period, there were only 2 serious cardiac events, neither of which were fatal or life threatening. In contrast, there were 21 serious cases of heat stroke, including 2 that were fatal and 12 that were life threatening. This highlights the issue of whether the material is able to absorb and dissipate sweat to facilitate the thermoregulatory system of the athlete.

In addition, athletes as consumers, have higher expectations of the type of sportswear they use. To understand the demands of consumers for sportswear, it is useful to assess the attributes of such products. Product attributes typically indicate the criteria for evaluating and selecting products and brands during the purchase decision process. Factors such as design, ergonomics, comfort and safety are just a few features to be considered [2].

Adapted from [2]

### Component 2: Establishing the importance of your study

After providing relevant background information to orientate your audience to your topic, the next step is to highlight the issue/problem that you addressed in relation to the topic. You can choose one of the following:

- present the research gap (what has not been done in previous research),
- raise a question about previous research, or
- propose an extension of previous research.

**Example of Component 2: Establishing the importance of your study**

Athletes believe that different sportswear affect their performance in the type of sports they do. As such, performance sportswear design is growing in importance and crosses the boundaries between the disciplines of design, technology and marketing [3]. In past research, tests have been done on 100% cotton and 100% polyester but not hybrids (specifically 80% Polyester, 20% Spandex and 60% Polyester 40% Cotton).

Adapted from [2]

### Component 3: Introducing your study

After providing background information and revealing the problem you investigated, you can now show how your study addressed this problem.
In Component 3, therefore, you should:

1. state the objective/hypothesis of your study,
2. outline the main features/scope of your study, and
3. explain the significance of your study.

1. Stating the objective of your study

- Write the objective as a brief statement.
- Include a specific verb to state exactly what you plan to do in your study.
- Use the infinitive of the verb, e.g., to measure, to analyse, to test.
- Extend your statement to describe briefly the significance of your study.
- Write the objective statement in either the simple past or the simple present tense.

2. Writing about the scope of your study – What (or how much) did the research cover?

- What did you investigate?
- What did you not investigate?

The scope makes clear how your study limited or narrowed the amount of work that you did to achieve your objective.

**Example of Component 3: Introducing the study**

The aim of this project was to determine the most suitable material (including hybrids) for use in sportswear in terms of heat dissipation, sweat dissipation, rate of evaporation of sweat/water and ease of stain removal. These factors were identified as those which would directly influence the main expectations of athletes regarding their sportswear. Insights from these experimental results will help athletes to decide on the most suitable sportswear to wear to optimise their performance.

Adapted from [2]

## Language focus

### Verb forms in the introduction

The simple present tense or present perfect is most commonly used in writing Components 1 and 2 of the introduction.

- Use simple present tense if you are providing general or factual information about your topic (e.g., *Athletes believe* that different sportswear affect their performance in the type of sports they do.).
- Use present perfect if you are referring to a period of time up to and including the present (e.g., In past research, tests *have been done* on 100% cotton and 100% polyester but not hybrids …).

The simple past tense is typically used in Component 3 when stating the research objective (e.g., The aim of this project *was* to determine the most suitable material …). However, the simple present tense is used when a report orientation is adopted (e.g., The purpose of this report *is* to analyse …).

### Modal verbs

In statements about the significance or value of the study, modal verbs (*will, may, could, might*, etc.) are commonly used (e.g., Insights from these experimental results *will* help athletes to decide on the most suitable sportswear to wear to optimize their performance.).

## Activity 2.1
### Identifying and reorganising information components

Arrange the 6 paragraphs to make a coherent introduction. First, identify the component represented by each paragraph in the space above it, and then sequence the components correctly.

_____

a. Fused deposition modelling (FDM) technology is the most commonly used process among commercially available 3D printers, as it is low in cost and easy to handle. In the FDM process, a thermoplastic filament is supplied into a heated extruder, where it is melted, and then a thin layer is continuously deposited on the heating bed.

_____

b. Therefore, this study advances beyond previous studies by evaluating the particle emission characteristics of various types of filaments in an exposure chamber under two different temperature conditions. Furthermore, we attempted to develop an effective control method to reduce particle emissions during 3D printing. Several different control methods were tested, and the effectiveness of nanoparticle removal during 3D printing was evaluated.

_____

c. Three-dimensional (3D) printers apply an additive manufacturing (AM) process, which involves joining materials to fabricate 3D objects from computer-assisted design (CAD) data, usually layer by layer. AM has many advantages over traditional manufacturing, such as reduced material costs and process simplification. [1]

_____

d. Despite the increasing popularity of 3D printers, consumers may overlook the possible effects of 3D printing on health. According to recent studies, nanoparticles and aldehydes are known to be emitted during FDM 3D printer operation. It is well-known that nanoparticles have effects on human health, including the inducement of adverse inflammatory responses.[2]

_____

e. Studies thus far have found that aerosols containing nanoparticles were highly emitted during 3D printing as a function of filament type and temperature, but the emission rates varied widely according to the experimental design, modelling, and the temperature applied, as well as filament types.[3] However, there have been no specific attempts to prevent or reduce the pollutants emitted during 3D printing.

_____

f. From these advantages, 3D printing has gained enormous interest as an emerging technology. The 3D printer market continues to grow rapidly, not only in the industrial sector but also in the consumer market. According to Wohlers Report (2016), the worldwide 3D printing market grew by 25.9%, and its size surpassed $5.16 billion in 2015.

Extracted from [3]

## Activity 2.2
### Analysing introductions to research articles

Read the introduction of the article 'Gold nanoparticles for cancer detection and treatment: The role of adhesion' [4] available on the main NTULearn course site and answer the following questions.

1. Read paragraphs 1-3 and write down the main idea for each paragraph. Has the author used the 'funnel' (general to specific) approach in the background component? Discuss.
2. What strategies are used to introduce the topic?
3. Read paragraphs 7 and 8. What components from the introduction are used here?
4. Underline the research gap, objective and scope.

## Activity 2.3
### Analysing objective statements

Objective statements express the main issues in a research study. Make sure you use standard and formal expressions and that the verb clearly indicates the objective. The verb forms can either be simple present or simple past. There are different ways of expressing the objectives in research. Which of the following statements are acceptable? Justify your answers.

| ✔ | Objective statement |
|---|---|
| | 1. This paper describes the techniques used to detect Android malware using a machine learning approach. |
| | 2. The purpose of the study is to create a Windows management instrumentation (WMI)-based penetration testing tool and a protection software to protect against WMI attacks. |
| | 3. We've been studying the aims at building up a pyramid of the multi-scale modelling approach for braided textile-reinforced composites, improving the accuracy of failure modelling and investigating the mechanisms of material behaviours under static and dynamic loading conditions. |
| | 4. The aim of this study is to really look into the kind of technology people like to buy when fixing their computer. |
| | 5. The aim of this project is to study drones and how they work. |
| | 6. This paper evaluates 3D printable geopolymer materials and compares them with conventionally casted geoplymer and analyses behaviour properties in the extrusion process. |

## Activity 2.4
### Analysing the introductions in research articles (continued)

Read the introduction to the research article 'Analysis of All Terrain Vehicle Crash Mechanisms' available on the main NTULearn course site, and answer the following questions.

1. In this introduction, is there a progression from general to specific when providing background information? Discuss.
2. Underline the gap, objective and scope. Is the approach to these components different from the previous article? Discuss.

# Activity 2.5
## Writing an introduction

You have been working on a project entitled 'Personality and occupational accidents in the construction industry in Singapore' and are now ready to write the introduction to your report.

Together with other members of your group, read the following notes on the project, select carefully what you need, and write an introduction in 250-300 words consisting of the three components:

a. giving background information,
b. establishing the importance of the study, and
c. introducing the study.

Credit sources using either the APA or IEEE citation style.

**Notes**

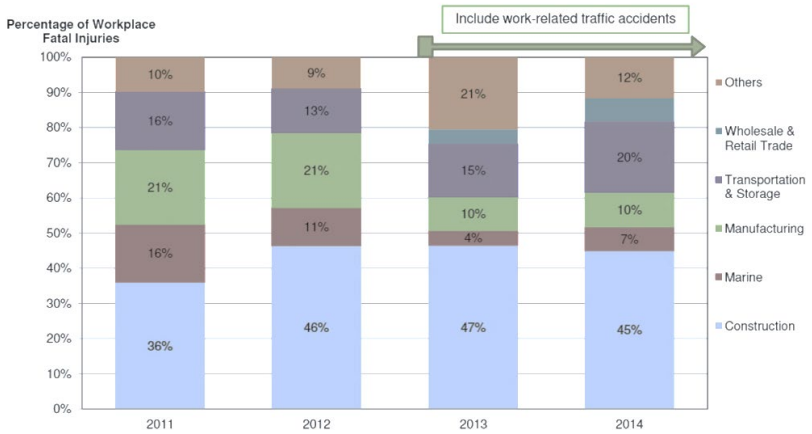
**Research Topic of Project**

- Construction – one of the most hazardous industries – high injury and fatality rates

A Great Workforce A Great Workplace

**Construction Industry Accounts for the Significant Share of the Fatal Injuries**

1




**What Previous Studies Found**

- S. Salminen, "Have young workers more injuries than older ones? An international literature review," *Journal of Safety Research*, vol. 35, no. 5, pp. 513-521, 2004. — reviewed studies of non-fatal and fatal injuries. Findings: (1) Young workers — higher injury rate vs. older workers; young workers — lower fatality rate vs. older workers; young men — greater risk for occupational injuries because of inattentiveness or recklessness while older workers because of mental agility problems; (2) studies have examined individual personality traits and their influence on accident involvement — consistent evidence of a predictive relationship lacking due to contradictory findings.

2

- C. M. Tam, S. X. Zeng, and Z. M. Deng, "Identifying elements of poor construction safety management in China," *Safety Science*, vol. 42, no. 7, pp. 569-586, 2004.: Safety management in construction industry in developing countries (e.g., China) very poor compared to developed countries.

1

- M. S. Christian, J. C. Bradley, J. C. Wallace, and M. J. Burke, "Workplace safety: A meta-analysis of the roles of person and situation factors," *J. Applied Psychology*, vol. 94, no. 5, pp. 1103–1127, 2009.: Showed personality assessments when done could minimize accidents and that assessing a person's personality traits and predisposition to commit unsafe acts could prevent accidents.

4

- S. Clarke and I. Robertson, "A meta-analytic review of the big five personality factors and accident involvement in occupational and non-occupational settings," *J. Occupational and Organisational*

3

*Psychology*, vol. 78, no. 3, pp. 355–376, 2005.: Reports meta-analysis of relationship between accident involvement and Big Five personality dimensions (extraversion, neuroticism, conscientiousness, agreeableness, and openness); low conscientiousness and low agreeableness found to be valid and generalisable predictors of accident involvement, with corrected mean validities of .27 and .26, respectively.

**Why more study is needed**

Previous studies have established a strong link between psychological factors and occupational accidents. Little research has been done on how construction workers' personality affects their safety behaviour.

**What I want to find out**

- Examine relationship between Singapore construction workers' personalities and occupational accidents — use Eysenck Personality Questionnaire (EPQ)
- Develop questionnaire and randomly distributed to 200 bar benders working on nine construction sites in Singapore. Why study bar benders? Work involves strenuous physical activity; often subject to poor ergonomic conditions.

Background; Objective; Scope

## Summary

In this unit, you have learnt about the three key information components typically found in the introduction to a report, and how to organise them. You have also learnt how to write an introduction using these components as well as how to use the appropriate language conventions for this purpose.

## Preparing for the Information Literacy Workshop and Unit 3

The following tutorial is a workshop on information literacy. The tutorial following the workshop is on reviewing and citing literature. Please remember to bring your laptop to class.

## References

[1] J. M. Swales, Genre Analysis: *English in Academic and Research Settings*. Cambridge, UK: Cambridge University Press, 1990.

[2] Anon et al., "Materials and its performance in sportswear," HW0210 Technical Communication report, Nanyang Technological University, Singapore, 2014.

[3] O. Kwon, C. Yoon, S. Ham, J. Park, J. Lee, D. Yoo and Y. Kim, "Characterization and Control of Nanoparticle Emission during 3D Printing," *Environmental Science & Technology*, vol. 51 no. 18, pp. 10357-10368, 2017.

[4] Y. Oni, K. Hao, S. Dozie-Nwachukwu, J. D. Obayemi, O. S. Odusanya, N. Anuku, et al., "Gold nanoparticles for cancer detection and treatment: The role of adhesion," *Journal of Applied Physics*, vol. 115, no. 8, pp. 1-8, 2014.

[5] S. Tanner, M. Aitken, and J. N. Warnock, "Analysis of all-terrain vehicle crash mechanisms," *Journal of Undergraduate Research in Bioengineering*, pp. 53-58, 2012.

Please note that the **IEEE style** of referencing, which you were introduced to in Engineering Communication I, is used in this and subsequent units. You will have a chance to refresh your memory about reference styles in **Unit 3** but you may recall that the main referencing style used in Engineering Communication I was the APA referencing style, another common referencing style in engineering schools. At the end of this course, you should be familiar with the two referencing styles, having had significant exposure to both.

# Unit 3

## Reviewing and citing literature

## Introduction

Reviewing and citing literature is a very important part of writing research papers and reports. Basically, in a literature review, you read about previous research in your area of interest, logically organise the information, and acknowledge the sources of the information cited. By reviewing the findings of other researchers, you not only familiarise yourself with the research in the area of interest but also establish a link between your study and other related studies. Sometimes, a review of literature means a review of previous/existing work or a review of previous/existing technology. For instance, in the field of computer science, a review of literature could focus on examining different hardware/software available for developing an application or a system.

Although the nature of some projects and reports may not require an extensive review of literature, the skills you acquire can also be applied when you write workplace documents.

## Learning outcomes

After completing this unit, you should be able to:

1. understand the significance of reviewing and citing previous research;
2. logically organise the relevant information you read from various sources;
3. cite reliable information appropriately in your writing;
4. apply language conventions typically used in writing literature reviews;
5. write a literature review related to the objectives of your study; and
6. systematically compile a reference list for your project report.

## Searching and gathering relevant information

The information literacy workshop conducted last week has provided you some search tools and a platform to find relevant materials or information needed for your study. In the search process, please remember to evaluate the sources of your information: the reliability of the authors, date of publication and so on (see Unit 3: Writing from sources: Evaluating, paraphrasing, summarising and citing information*, HW0188 Effective Communication*).

## Location and functions of a literature review

Although we discuss writing the literature review section separately in this chapter, a literature review often appears in various sections of your FYPs or other research reports. For example, in the introduction chapter, you might discuss the background of the study with reference to some earlier studies in the area so as to illustrate the overall trends in the related research and your familiarity with the area of your research. Similarly, in the results chapter, you could compare your own findings with those of other researchers so as to strengthen your own research.

Meanwhile, it is worth noting that in most research papers or short reports, the literature review section is usually incorporated into the introduction of the paper, although some papers may have a separate paragraph or two titled 'Theoretical framework', or simply 'Theory' rather than a lengthy 'Literature review' [1]. However, in FYPs, Master's/PhD theses or research reports, the literature review is often a separate chapter.

## Activity 3.1
### Analysing the functions of a literature review

Read the Introduction and Theory sections of the research paper 'Gold nanoparticles for cancer detection and treatment: The role of adhesion' [1] and in pairs or groups, analyse the main functions of the literature review in these two sections of the paper. (Please note that your tutor may use a different research paper for this activity.)

| Sections | Functions of literature review |
|---|---|
| **Introduction** | |
| **Theory** | |

## Organising information in a literature review

Writing a good literature review for your report starts from searching for and reading previous studies in your area of interest. After you have read and gathered enough relevant information to write your literature review chapter, you need to think about how to organise the information logically so that your readers can easily follow the ideas presented in your literature review. As in other sections of your FYP, you can start your literature review with **an overview** or **general statements** to give your readers an idea what will be discussed. The following is an example of an overview for a literature review section of an FYP.

**Example of an overview of the literature review section**

In this section, previous studies on the development of transportation and logistics issues and their consequences and impacts will be reviewed. Specifically, the review will be divided into three areas, namely (a) the historical development of transportation and logistics services in Asia and Singapore; (b) the specific challenges surfaced; and (c) specific measures taken and their effectiveness, and impacts on the economy in the region. This section ends with a reiteration of the objectives behind this investigation.

Adapted from [2]

Broadly speaking there are three ways to organise the information in a literature review. First you can organise your literature review in a **chronological order**, i.e., from earlier studies to more recent ones. This way of reviewing literature has the advantage of tracing the historical development of the particular area of study.

Another way to organise the body of information is moving your discussion from studies generally related to your topic to studies very close or specific to the area of your research, i.e., **general to specific** or **distant to close**. If, for instance, your research is on greenhouse gas emissions and their environmental impact in relation to taxis (i.e., the specific area of research), you could start the review of literature with other vehicles (i.e., some general background).

Alternatively, you can also use the **thematic approach**, which means you discuss all the relevant information about your area of interest through comparison and contrast, cause and effect, or any other thematic approach. You should bear in mind that sometimes a combination of all the approaches could be used to write your entire literature review chapter.

# Activity 3.2
## Analysing the organisational pattern of a literature review section

In pairs, identify the kind of organisational pattern the authors used in writing each of the following sections of a literature review.

**A:** Thematic

Named Entity Recognition (NER) has been extensively studied on formal text (such as news articles [9]), informal text (such as emails [10], [11]), and social content (such as Tweets [12], [13]). The goal is to recognise real-world objects in texts, such as persons, locations, and organisations. Some NER works from other domains exist for recognising domain-specific entities, such as BiomedicalNER [14], [15], NER in clinical notes [16]. In contrast, our study focuses on designing domain-specific NER methods for software engineering social content, a new genre of social technical texts. Proposed solutions to NER fall into three categories: rule-based, machine learning based, and hybrid methods. Existing studies show that machine learning based methods usually outperform rule-based methods [9], [12], [16]. However, for software engineering texts, existing approaches are limited to dictionary look-up and rule-based methods based on code or text parsing techniques [17], [18], [19], [20].Furthermore, the entity category is limited to only Application Programme Interface (API).

Adapted from [3]

**B:** General to specific

Research has shown that there has been an increase in vehicle accidents worldwide in the last decade and the trend can be expected to go upward due to the increasing number of vehicles on the road and other related factors [1], [3]. So far, a lot of effort has been made by researchers to investigate the reasons for various road accidents and possible ways to prevent accidents. Meanwhile a new field of engineering research is developing because of the increasing number of all terrain vehicle (ATV) crashes. ATVs are widely used for recreation, farming, and utility purposes. Statistics have shown that 45% of the ATV crashes are the result of the machine flipping or turning over [2]. Therefore, there is an urgency to test and determine the engineering mechanisms behind the turnover crashes.

Adapted from [4]

**C:** Chronological

To manage and sustain the national water supply, Singapore has seen innovative approaches such as the reuse of reclaimed water, the establishment of protected areas in urban rainwater catchment as well as seawater desalination.

In 2002 Singapore commissioned its first reclaimed water plant which had been monitored for about two years to ensure safe water quality [1]. The active marketing campaign by various agencies involved paved the way for the success of this approach. Subsequently in 2005 Singapore opened its first seawater desalination plant [2]. In the meantime it also further expanded its reservoirs to cater to the increased demand of water. Today's largest reservoir, the Marina Bay reservoir, was inaugurated in 2008. It is located in the estuary of a river that has been closed off by a barrage to keep the seawater out. Two similar barrages were completed in July 2011, forming the Punggol Reservoir and the Serangoon Reservoir [3]. There is no doubt that Singapore has become a global water research and technology hub with active support from the government.

Adapted from [5]

After you have extensively examined the related works in your area of interest (i.e., discussing the previous research), you need to identify the **research gap**. The gap justifies the need for your research and provides the basis for formulating the objectives of the current study. This gap is often signalled by the use of transition words such as 'however', 'but', or 'yet'. The following example illustrates how

researchers often indicate the gap by highlighting what is missing from the previous research and what the current research plans to achieve.

> Numerous researchers conducted experiments where different materials were stained and washed [1], [3], [6], [9]. **However**, the experiments mainly focused on wool and wool hybrids, which are not related to sportswear materials, and only food samples, were used for the stains. Therefore, there is **a need to** further investigate more practical variables so that athletes will be more able to better determine the ideal material for removal of stains.
>
> Adapted from [6]

Figure 3.1 below summarises the previous discussion and provides a logical framework for you to consider when organising the information in your literature review chapter.

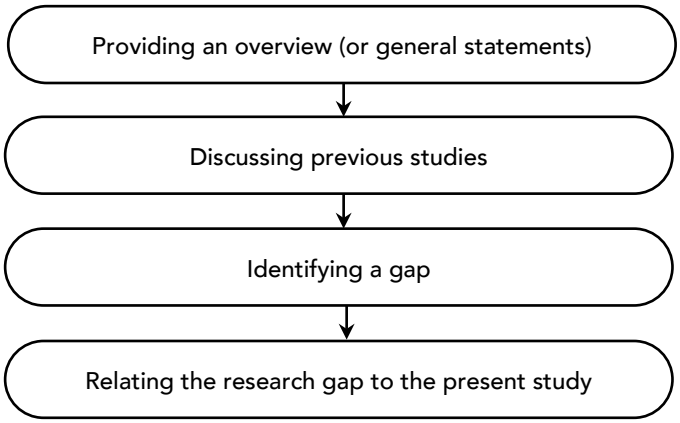



Figure 3.1: Logical development of a literature review

Note: The model of the literature review presented in Figure 3.1 may be considered a 'generic' or 'structured' model of a literature review in many disciplines. However, there may be some variations to the above model, for example, when particular research projects expand or replicate previous research projects.

## Activity 3.3
### Re-arranging statements to reflect logical sequence

The following statements include references to a literature review. These statements are in scrambled order. Number the statements in an order that places the references in an appropriate position.

_____ To address this issue, government agencies and researchers have been exploring various ways to develop an advanced and efficient waste management system in Singapore.

_____ Despite the fact that Singapore now owns a well-managed waste disposal system in maintaining a clean city-state, some argued that much more effort is needed in recycling so as to ease the heavy reliance on the waste management infrastructure, for example [2], [3], [4].

_____ Waste management poses a serious challenge in Singapore given its limited land area and densely populated living environment. Meanwhile, Singapore's booming economy and growing population have also contributed to the increase in the amount of solid waste disposed from 1,260 tonnes a day in 1970 to a peak of 8,559 tonnes a day in 2016 [1].

_____ Therefore this research aimed to investigate the role gender and age play in domestic recycling in Singapore.

_____ So far, there has been a considerable amount of research conducted on recycling in Singapore [5], [6], [7], however more could have been done to specifically investigate factors affecting domestic recycling in Singapore.

Adapted from [7]

## Writing a literature review

### Plagiarism

When writing the literature review chapter, you should take all possible precautions to avoid plagiarism. You may recall that using ideas, expressions of ideas, or any other information (e.g., statistics, graphics, and sentences) from other sources without acknowledgment is regarded as plagiarism (Unit 3: Writing from sources: Evaluating, paraphrasing, summarising and citing information, *HW0188* Effective Communication). You can revisit NTU's website on plagiarism: http://www.ntu.edu.sg/ai/ForStudents/Pages/index.aspx. In order to avoid committing plagiarism, you should cite the sources from which you obtained the original information. The following section discusses the various ways of citing sources, both within the main text itself (in-text citations) as well as in the final reference list.

### Citing literature

When writing a literature review, you will have to cite or make reference to other researchers' works by **summarising and paraphrasing** the relevant information you have read so that your arguments are well supported by evidence. At the same time, you must acknowledge or cite the sources of the information.

There are two main citation styles in academic writing: one is the number system and the other is the author/date system. As these citation styles have already been taught in HW0188 Engineering Communication I, we shall just briefly revisit the two styles.

*The number system*

The number system is adopted by the Institute of Electrical and Electronics Engineers (IEEE) and commonly used by engineers and scientists. When you use this system, you insert a number beside the cited text in square brackets. The number may also be inserted in superscript with or without brackets. This number corresponds to the relevant entry in the reference list at the end of your paper or report. For example:

> Some researchers have recently discussed and debated the issue of water pollution and treatment in the sea shore [3], [6].
>
> The difference in experimental readings was due to the lowering of room temperature during the first phase of the experiment [2].

If readers want to know the details of the citations within the text, they can go to the final reference list at the end of the paper or report.

More detailed information about the IEEE citation style can be found at [9].

*The author/date system*

In this style of referencing, the surname of the author(s) you are citing and the year of publication are clearly stated in the text. If the information is from a specific page of a book or paper, then the page number can be included as well. For example:

> Soil gradually loses organic matter, becoming more compact, has less microbial activity and is unable to retain water and nutrients if only synthetic fertilizer is used (Wang, 2014, p. 2).

> Chan and Wang (2013) stated that the health of soil was important in nurturing the beauty of nature and providing good nutrients in the food that humans consume.

In the first example, the emphasis is on the information, so the author's name, the year of publication and the specific page number are placed at the end of the sentence in parentheses. This method of citation is called 'information prominent' citation. In the second example, the emphasis is on the authors. You should take note that past tense ('stated') is used to reflect the accurate intentions of the authors and this style is called 'author prominent' citation. But in the first example, the simple present tense ('loses') is used because the emphasis is on the information.

The above examples are based on the style indicated in the publication manual of the American Psychological Association (APA). Detailed information about using references in APA style can be found at [10].

### Citing figures and tables

In scientific and engineering papers or reports, there are only two kinds of illustrations: figures and tables. If you are using a table or figure from another source, you should acknowledge the source by placing a citation number in brackets directly after you mention the table or figure and then list it in the final references. For example, if you use the following figure in your paper or report, you place the citation number [2] after the caption if the number corresponds to reference [2] in the final list of references.

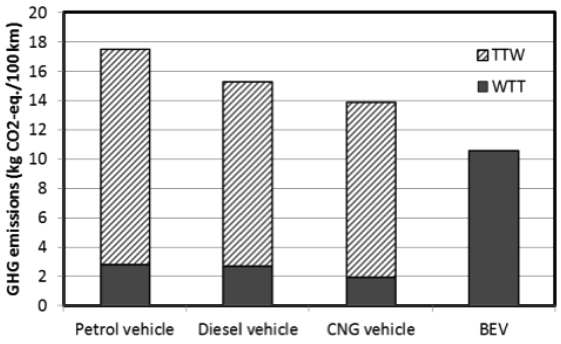



Fig. 1. GHG emissions per kWh final energy (a) and GHG emissions per driven 100 km [2]

However if you use the APA style, the author(s) and year of publication are provided in parentheses: "Fig. 1. GHG emissions per kWh final energy (a) and GHG emissions per driven 100 km (Reuter 2014)".

## Language focus

### Presenting your comments

Writing the literature review does not only involve summarising or paraphrasing what other researchers have done in the area of your research. More importantly you should link the citations to your own research. You should express your views or comments about others' works in relation to your research objectives. As a result, your own comments or arguments will be strengthened with the support of citations and evidence.

There are many ways you can comment on other studies. You can compare and contrast, analyse cause and effect, evaluate, and so on. The following is an example of how an author comments on studies related to his own study.

Although the experimental set-ups seemed to be similar, the latter emphasised the variation of temperature during the experiment more than other factors. This could explain the drastic differences in their statistical results. The experimental design of the current study has added one more factor, i.e., the humidity of the weather during testing, and resulted in a significant reduction of the experimental cycle.

Adapted from [6]

Appropriate and precise use of language such as selection of words, grammar and sentence structure can help you express your views or arguments more accurately.

## Activity 3.4
### Highlighting words and phrases that show the author's views/voice

Read the following paragraph and then in pairs, discuss and highlight words/phrases that show the author's views on other studies.

Shared driverless vehicles have the potential to reshape our city. Analysts predict that driverless vehicles may account for half of all road travel by 2040. First of all, they could decrease private vehicle ownership, congestion and air pollution while increasing safety, access and mobility. They may also reduce the need for parking spaces in prime real estate where jobs and residents tend to be, since parking no longer needs to be co-located with them. Furthermore, it seems that these driverless vehicles also bring with them the potential to free up road space – spaces that can be redesigned for other uses – not just housing or commerce but also walkways, bicycle lanes and more green spaces.

Adapted from [8]

## Common mistakes in students' literature reviews

A good literature review requires many levels of effort, including searching for relevant and reliable information, critical reading and thinking, effective organisation and writing skills. When writing your literature review, you should pay attention to the following common pitfalls:

- listing or summarising findings by other researchers without incorporating your own views or comments;
- failing to link the discussion of others' works to your own research objectives;
- distorting the original information you have read; and
- failing to include the most recent literature or focusing too much on online references.

## The style of the final reference list

There are many different styles in listing final references. Many engineers and scientists follow the IEEE style. Detailed information about the IEEE referencing guidelines can be found at http://ieeeauthorcenter.ieee.org/wp-content/uploads/IEEE_Style_Manual.pdf [9]. There are also other styles you may have come across, e.g., the Council of Science Editors (CSE) and the Council of Biology Editors' Manual for Editors and Publishers. The best practice would be to familiarise yourself with the commonly used styles but focus on the style used in your discipline.

Despite all the differences in referencing style, the general guideline is to include the following information in each full reference and be consistent throughout the entire references list:

- Author(s)'s name;
- Year of publication;
- Title of journal/book;

- Publisher/place of publication; and
- Page number/volume number (for a journal article).

The following example is based on the IEEE citation reference style. The numbers in square brackets correspond to the references cited in the text.

**References (IEEE style)**

[1] R. J. Chou, "Addressing watercourse sanitation in dense, water pollution-affected urban areas in Taiwan," *Environment & Urbanization*, vol. 25, no. 2, pp. 523-540, 2013.

[2] J. Smith and A. Thomson, The Polluted Rivers. Cambridge: Cambridge University Press, 2014.

[3] D. H. Valur, 'Restructuring robots for new markets,' In Market Driven Technology Development, D. Collins and M. Bum, Eds. Chichester, England: Wiley, 2004, pp. 115-131.

[4] J. Schall. (2013). *Effective technical writing in the information age* [online]. Available: https://www.e-education.psu.edu/styleforstudents/c2.html.

If you use the APA reference style [10], the reference list should be listed alphabetically according to the first author's surname.

**References (APA)**

Chou, R. J. (2013). Addressing watercourse sanitation in dense, water pollution-affected urban areas in Taiwan. *Environment & Urbanization*, *25*(2), 523-540. doi:10.1177/0956247813501140.

Schall, J. (2013). *Effective technical writing in the information age*. Retrieved 15 July 2014 from https://www.e-education.psu.edu/styleforstudents/c2.html.

Smith, J., & Thomson, A. (2014). The polluted rivers. Cambridge: Cambridge University Press.

Valur, D. H. (2004). Restructuring robots for new markets. In D. Collins & M. Bum (Eds.), Market driven technology development (pp. 115-131). Chichester, England: Wiley.

## Activity 3.5
### Listing references in IEEE or APA style

List 2-3 references you intend to use for writing the introduction in Assignment 1. Ask your partner to check if the references are written correctly in the IEEE style.

**References**

## Summary

In this unit, you have learnt how to organise the large volume of information you have gathered from various sources and how to integrate this information into your own writing. You have also familiarised yourself with using appropriate in-text citations and preparing final references.

## Preparing for Unit 4

The next tutorial is on writing the Materials and Methods section. Please read through the unit before class as the tutorial will focus on classroom activities. No class time will be given for reading.

## References


[1] Y. Oni, K. Hao, S. Dozie-Nwachukwu, J. D. Obayemi, O. S. Odusanya, N. Anuku, et al., "Gold nanoparticles for cancer detection and treatment: The role of adhesion," *Journal of Applied Physics*, vol. 115, no. 8, pp. 1-8, 2014.

[2] B. Reuter, K. Schonsteiner, M. Wagner, D. Gleyzes, T. Massier, T. Hamacher, and M. Lienkamp, "Life cycle greenhouse gas analysis for automotive applications – A case study for taxis in Singapore," *International Journal of Smart Grid and Clean Energy*, vol. 3, no. 2, pp. 127-134, Apr. 2014.

[3] D. Ye, Z. Xing, C. Y. Foo, Z. Q. Ang, J. Li, and N. Kapre, "Software-specific named entity recognition in software engineering social content," in *IEEE 23rd International Conference on Software Analysis, Evolution, and Reengineering*, 2016, pp. 90-101.

[4] S. Tanner, M. Aitken, and J. N. Warnock, "Analysis of all-terrain vehicle crash mechanisms," *Journal of Undergraduate Research in Bioengineering*, pp. 53-58, 2012.

[5] B. L. Ong, "Singapore water management policies and practice," *International Journal of Water Resources Development*, vol. 26, no. 1, pp. 65–80, 2012.

[6] Anon et al., "Materials and its performance in sportswear," HW0210 Technical Communication report. Unpublished manuscript, Nanyang Technological University, Singapore, 2014.

[7] Anon. "Waste management and domestic recycling in Singapore," HW0188 Engineering Communication I report. Unpublished manuscript, School of Civil and Environmental Engineering, Nanyang Technological University, Singapore, 2017.

[8] L. Cheah, "Driverless vehicles can reshape Singapore, but do consider the human elements," *Channel News Asia*, Dec. 2, 2017. [Online]. Available: https://www.channelnewsasia.com/news/singapore/commentary-driverless-vehicles-reshape-singapor e-smart-nation-9451258

[9] IEEE Periodicals Transactions/Journals Department, *IEEE Editorial Style Manual*, 2016. [Online]. Available: http://ieeeauthorcenter.ieee.org/wp-content/uploads/IEE E_Style_Manual.pdf

[10] American Psychological Association, *Publication Manual of the American Psychological Association*, 6th ed. Washington D.C.: American Psychological Association, 2010.

# Unit 4

## FYP reports: Materials and Methods

## Introduction

In a 'research-style' FYP report, a Materials and Methods chapter or section often follows the introduction and literature review. If yours is this type of FYP, this chapter or section is essential because it allows the reader to judge the validity and reliability of the results and conclusions of your study. As the name suggests, 'Materials and Methods' typically comprises two parts:

- details of the materials and/or equipment used in the test or experiment (often under the sub-heading 'Materials'), including where relevant, how the equipment was set up; and
- a description of the test or experimental procedures used (often under the sub-heading 'Procedures' or 'Methods' or '[name of test or experiment]').

As mentioned in Unit 2, in FYPs with deliverables, chapters or sections on the design and implementation of the deliverable follow the introduction and literature review. These chapters or sections are even more important in such FYPs than Materials and Methods in research-style FYPs because they describe the core of your project: your readers' main interest is in how you went about designing or developing your deliverable, whether it is a piece of software, a machine or a smartphone app, to name a few examples. Again, these chapters or sections typically comprise two parts:

- details of the components and/or equipment used for building the deliverable, including how they are used together (for instance, when building a smartphone app, the software used and the system architecture); and
- a description of the process of building the deliverable (usually including explanations for some steps taken, especially if these steps are innovative).

The typical headings for the design and implementation chapters or sections vary among disciplines, and you should look at examples of past FYP reports on projects similar to yours to decide what headings are suitable.

The content of this unit is based on the Materials and Methods chapter or section of research-type FYP reports. However, the information components and language structures highlighted apply equally well to deliverable-type FYP reports. If your FYP involves a deliverable, you just need to adapt what you learn here to write the design and implementation part of your report. You may discuss with your tutor how to do this.

This unit begins by exploring in greater depth the purpose and importance of the Materials and Methods chapter or section of a research-type FYP report. If yours is a deliverable-type FYP, you should consider how this is similar or different for the design and implementation chapters or sections. We then consider the information components and language structures that are necessary to fulfil the purposes of this part of your report.

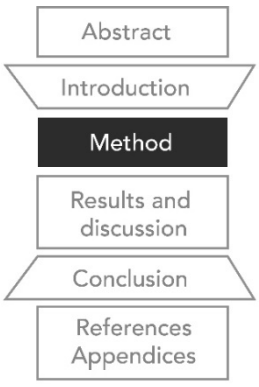



Figure 4.1: Structure of a research report – Method [1]

## Learning outcomes

After completing this unit, you should be able to:

1. understand the purpose and importance of the Materials and Methods section in a research report;
2. select appropriate details to include in the Materials section and an appropriate level of detail for describing the procedures used;
3. organise the information in the Materials and Methods section to make the description reader-friendly;
4. use appropriate and effective language forms and constructions when describing materials and procedures; and
5. produce a systematic, clear, and precise description of the materials and procedures used in a research report.

## Activity 4.1
### Exploring the purpose and importance of the Materials and Methods section

Discuss the following questions as a class:

1. One important purpose of this section is that 'it allows the reader to judge the validity and reliability of the results and conclusions of your study' (see the first paragraph in the introduction to this unit).
   a. What would the reader look out for, in order to make a judgement?
   b. What other purpose might this section have?

2. Read the Materials and Methods section of the research paper 'Gold nanoparticles for cancer detection and treatment: The role of adhesion' [2] (available on the main course site).
   a. What, in this description, would make you believe that the results and conclusions of this study will be valid and reliable?
   b. What do you think you need to do when writing this section to achieve its purposes?

In the rest of the unit, we explore the information components and desirable language structures of each of the two parts of this section ('Materials' and 'Methods') in turn.

## Part A: Writing the Materials section

### Information components

Engineers use a wide range of different methods in their research. Depending on the type of research you decide to do, the materials you need to describe will differ. In this unit, we focus on two types of studies — experiments or tests, and social surveys.

*Experiments or tests*

The 'materials' you may need to describe include:

- a list of the physical items and substances used, and/or
- the construction or set-up of the equipment.

## Activity 4.2a

### Analysing information components in the Materials section of experiments and tests

1. When (and why) do you think it is important to provide specific details of:
   a. the physical items and substances used?

   b. the construction or set-up of the equipment?

2. Example 1 below is the Materials sub-section of 'Gold nanoparticles for cancer detection and treatment: The role of adhesion' [2] (available on the main course site):

**Example 1**

The gold nanoparticles were purchased from Nanopartz Inc. (Loveland, CO), while the uncoated AFM tips were purchased from Veeco (Memphis, TN). Paclitaxel was obtained from Parenta Pharmaceuticals (West Columbia, SC), while LHRH was purchased from Thermo Scientific (Waltham, MA). The Breast Specific Antibody (BSA) and thiols were obtained from Sigma-Aldrich (St. Louis, MO).

Extracted from [2]

   a. What details did the authors provide, and why do you think they included these details?

   b. What other details about the materials might be important for you to include for the types of experiments you may carry out?

3. The paragraphs below are jumbled, and not in order. They are from the Materials section of a study [3] that sought to assess the energy savings and environmental benefits which 'vegetal facades' for buildings can bring, in comparison to traditional facades. To carry out their experiment, the authors built a translucent green wall with a 'vegetal layer' (a layer with plants) in an experimental building. They also built a similar wall without the layer.

The paragraphs describe the design of the green wall, part of the test 'equipment' for the experiment.

a. Rearrange the paragraphs according to what you think should be the correct order.

1. The interior layer constitutes a Technal GXi sliding sash window. It consists of a two-panel sliding window (1,42031,410 mm). A 9-mm flush polyamide thermal break for enhanced thermal performance was placed in the central cross junction and transoms. Double glazing (14 mm) and a cavity wall (12 mm) were also provided by sealing with ethylene propylene diene monomer (EPDM) rubber glazing gaskets.

2. The constructive system was designed to implement a strategy with the following features: hygiene ventilation, thermal ventilation, and solar protection. The size of the greenhouse space was adjusted to achieve suitable vegetation growth that could fully cover the chamber.

3. The external layer regulates the thermal conditions of the greenhouse space by limiting airflow and moisture as needed. This external wrapping is based on a truss/lattice of adjustable polycarbonate glass slats (5 mm) attached to an aluminium window case. The slats can be adjusted through a domotic system operated from inside the dwelling.

4. The translucent green wall system has been designed to be an extra flat greenhouse space with the incorporation of a vegetal element. It consists of three industrialized constructive layers that are placed consecutively to be halfway indoors and halfway outdoors: interior layer (sliding sash window), intermediate green layer (vertical vegetal system), and external layer (adjustable slat lattice).

5. The intermediate green layer is conceived as a vertical system with the following components: metallic plant box with immersion self-irrigation system and timer control, steel helical cables as a standard for plants, and aluminium window case with metallic screws.

Extracted from [3]

b. Explain how you sequenced the paragraphs. What were some 'clues' that helped you?

c. Apart from details about the different parts and materials that make up the wall, what other types of information did the authors provide? Why do you think they included such information?

d. What can you learn from this exercise about:

i. what to include in describing the set-up or construction of equipment in an experiment, and

ii. how to organise or structure such a description?

*Social surveys*

Strictly speaking, social surveys do not involve the use of 'materials'. If your FYP involves a survey, you will need to describe your sources of data and your survey instrument, i.e.,

- archival sources, e.g., official sources such as published statistics available from government bodies or published technical reports;
- the sample population of your survey (i.e., the participants or respondents); and
- the survey instrument, usually a questionnaire or set of interview questions.

## Activity 4.2b

### Analysing the information components describing data sources in social surveys

1. What kind of details do you think you need to provide in describing:
   a. archival sources for data?

   b. the sample population?

   c. the survey instrument?

   Why are these details important?

2. You can choose either (i) to describe your sources and research instruments separately, before describing the procedures you used for carrying out your study; or (ii) to integrate your description of your sources and instruments into the description of your procedure.

   In Example 2 below, the authors describe their sources and instruments separately from their data collection, collation and analysis methods. Their study investigates why drivers engage in actions and behaviours that may distract them and endanger road safety (for example, texting while driving). It also investigates whether such actions and behaviours (which the authors label as 'distraction engagement') are related to personality traits.

   In Example 3 below, the authors integrate their description of their sources and instruments into their description of how they carried out their study. The study seeks, in part, to identify shore-based and near-shore activities associated with maritime operations that are not covered by the existing International Safety Management (ISM) Code for sea transportation and 'other operations at sea'. The authors hope through this to identify key safety issues that would need to be addressed to improve the global maritime safety management system.

**Example 2**

2. Method

2.1. Instrument

Susceptibility to Driver Distraction Questionnaire (SDDQ, Feng, Marulanda, & Donmez, 2014) was administered online to collect data used in this study. Self-reported frequency of distraction engagement was assessed by pairing the questionnaire item ''When driving, you ...'' with six driver distractions: (1) have phone conversations, (2) manually interact with a phone (e.g., sending text messages), (3) adjust the settings of in-vehicle technology (e.g., radio channel or GPS), (4) read roadside advertisements, (5) visually dwell on roadside accident scenes if there are any, and (6) chat with passengers if there are any. Responses were collected on a 5-point Likert scale comprised of 'never', 'rarely', 'sometimes', 'often', and 'very often'. For scoring purposes, these anchors are assigned points from 1 (never) to 5 (very often).

Facilitators of voluntary distraction collected data on the following TPB constructs: attitudes ('you think it is alright for you to drive and ...'), perceived control ('you believe you can drive well even when you ...'), perceived descriptive norms ('most drivers around me drive and...') and injunctive norms ('most people who are important to me think it is alright for me to drive and...'). Each construct was probed using the same list of six distractions described earlier for self-reported engagement. Responses in this section were collected using a 5-point Likert scale anchored at 'strongly disagree' (1), 'disagree', 'neutral', 'agree', and 'strongly agree' (5).

The survey also included demographic questions as well as a number of existing questionnaires and scales on driving behaviours and personality characteristics. ... For personality traits that were deemed relevant, we included the impulsiveness and venturesomeness subscales from Eysenck Impulsiveness Questionnaire (Eysenck & Eysenck, 1978), and Arnett Inventory of Sensation Seeking (Arnett, 1994).

2.2. Participants

Participants were recruited using online advertisements, electronic mailing lists, and posters around the University of Toronto campus. Five additional senior respondents (60+) were recruited from the Adult Volunteer Pool, a list of potential seniors interested in participating in scientific experiments, managed by the Department of Psychology at the University of Toronto. To be eligible for the study, participants had to have a valid driver's license. They were encouraged to complete the survey to enter a draw to win one of two iPads. In total, 578 participants completed the survey over a period of seven months. The sample consisted of 354 males and 224 females with ages ranging from 18 to 77 (Table 1).

Extracted from [4]

**Example 3**

RESEARCH DESIGN AND METHODOLOGY

There are two main research methods applied in this study. First of all, a focus group discussion through e-mail was utilised to explore ideas and obtain perceptions of experts and operators in the field. Based on this, a postal survey was conducted by sending a questionnaire to the international maritime community. Prospective participants in the focus group were selected from the contact database of the Australian Maritime College. Maritime experts in Australia and New Zealand, with their background and expertise being port authorities; harbour masters; marine pilots; port operators; maritime consultants; VTS managers; and maritime administrators, were contacted. An e-mail containing the project's background, objectives and methodology was then sent to all participants. Upon confirmation of acceptance, an eight-question questionnaire was sent to all participants. The open-ended questions included in the questionnaire aimed at exploring participants' perceptions on issues such as the need to extend the ISM Code to cover shore-based activities; key activities that should become part of the MSMS; main players involved; safety-related relationships among them; key safety issues and risks associated to them; and basic criteria for a good maritime safety plan. Other inputs which they felt were necessary for the MSMS were also invited.

The responses of the participants were subsequently collated with author-related links removed, then synthesised and analysed into a single document. This was then sent around to all participants for their comments and additional inputs before being finalised. Upon completion of this process, the final version of the discussion analysis was devised. Based on this analysis, a detailed postal questionnaire (Appendix) was developed and sent around to participants again as a pilot study for their comments. It was then verified and finalised before being sent out to the international shipping community, together with a cover letter explaining the background and objectives of the study. The questionnaire contained seven main sections with ten questions addressing issues identified through the analysis of the discussion, and one general section inquiring on the demographic information of the respondents. Since the topic of this study was exploratory in nature, the questions were both close and open-ended to provide respondents an opportunity to expand upon or explain their answers. The measurement scales applied were both nominal and ordinal, since the main purpose of the questionnaire was to explore the attitude of respondents towards the related issues being surveyed.

Extracted from [5]

a. In Example 3, identify the sentences which describe the data sources. (Note that this study employed two research methods — a focus group discussion, and a postal survey. There are therefore two sets of data sources — one set of participants and an instrument for the focus group discussion, and one set for the survey.)

b. What details do the authors provide about the participants and instruments used in each study?

c. How do the different details establish the validity and reliability of each study?

d. Where and how have the authors used archival sources? What details are provided, and why?

e. Why else might certain details about the participants and instruments have been included?

f. Try to re-write Example 3 by re-structuring the content so that you describe the participants and instruments separately from the procedure undertaken:

   i. Do you think this is a better way of organising the content?

   ii. When might it be better to integrate the description of sources and instruments into a description of procedures, as the authors have done in this example?

## Language focus

# Activity 4.3

## Studying and using appropriate language structures in describing materials, data sources, and instruments

1. Study closely the examples used in Activity 4.2a and Activity 4.2b (i.e., Examples 1, 2 and 3 and the jumbled text in Activity 4.2a). When is the present tense used, and when is the past tense used?
2. Now read the passages below and fill in the blanks with the verb given, using the correct tense.

a. The generator grid _____ (consist) of 12 vertical rods 38mm in diameter spaced 85mm apart. This grid _____ (produce) an isotopic turbulence level of Tu=21±1% across a width of ±0.4P where P _____ (be) the distance, or pitch, between airfoils. The integral length scale _____ (be) $\Lambda_f$=4 cm. This measurement _____ (be) taken at x/C=0.27 in front of the leading edge.

Extracted from [6]

b. The first building _____ (be) a 1,722m$^2$, two-story, steel-framed, commercial office building with non-operable windows. The HVAC system for the building _____ (consist) of seven split-system heat pumps in an attic mechanical room. Supply air (11,519 L/s, 24,410 cfm total) and return air _____ (be) ducted, and a fixed amount of outdoor air (1,538 L/s, 3,260 cfm total) _____ (be) ducted to each heat pump unit.

Extracted from [7]

c. The developed questionnaire _____ (consist) of three parts. First, personal data _____ (be collected). These _____ (include) demographic data (age, gender, etc.); and information regarding occupation, income, and residential area. Details about (e-)vehicle use, the general attitude towards electromobility, and charging possibilities including the possibility to use fast charging _____ (be also included). Second, the participants _____ (receive) a scenario-based introduction to the fast-charging technology to guarantee a common minimum knowledge. The used scenario _____ (state) a range scenario of 100 km after a fast-charging time of 25 min. Third, the following user requirements _____ (be gathered): …

Extracted from [8]

d. A total of N=252 participants _____ (complete) the survey and stated that they were interested in electromobility. The mean age _____ (be) 39.22 years (SD=12.20) and _____ (range) from 19 to 75 years (Mdn=38.50). … 184 (73%) of the participants _____ (be) male, and 68 (27%) _____ (be) female. 47.6% (n=120) _____ (report) a university degree as their highest level of education. 14.7% (n=37) _____ (complete) a vocational training while further 26.5% (n=67) _____ (indicate) finishing A-levels. The remaining participants _____ (report) having a vocational diploma, a secondary school certificate, or a doctor's degree.

Extracted from [8]

3. What are some commonly used verbs from the examples in Activity 4.2a and Activity 4.2b, as well as in the exercise above? Can you think of other verbs that might be useful in this part of your FYP report?

## Part B: Writing the Methods or Procedures section

### Information components

In order for your reader to judge whether the results of your study can be trusted, and to understand the limitations of your findings, you must describe how you carried out your study systematically, adequately and clearly. This will also enable anyone who wants to replicate your study to verify your findings to be able to do so.

*What to include*

A good description of the methods or procedures you have used in your study should include the following:

- A **systematic, step-by-step account** of what you did in carrying out your experiment, survey or any other form of study: if your study comprises a few **different stages** or parts, the account should be divided into these stages or parts.
- Exact and **specific information** on **technical details** such as the ratio of dilution, pH range, temperature, duration of application of a force, etc. for experiments, and period of survey, statistical tests applied and degree of confidence used, etc. for surveys.
- **Justifications** or **reasons** for why you chose to do certain things in the way you did.

*How much to include*

A common issue for many writers is how detailed the step-by-step account needs to be. A good rule-of-thumb to follow is that your account should be complete and detailed enough for any reader to carry out the same procedure without missing any important steps.

More specific guidelines include the following:

- If you are using an established procedure without modification, you do not need to go into detail, especially if it is very well-known. Name the procedure or experiment, and if you think it is necessary for your reader, summarise it. You may also need to justify why you have adopted the procedure.
- If you are using an established procedure, but modifying some of the steps, describe the changes in sufficient detail, and draw attention to them. Be sure to explain the reasons for each modification.
- If you are using a novel procedure which you have come up with, describe it in as precise detail as possible. Also, explain how you came up with your procedure, as well as justify why you have taken each step.

*How to organise and present the information*

To help your readers to follow your description of your procedures more easily, consider carefully how you may organise and present your information to enhance readability. Here are three possible strategies:

- If you are permitted to do so, present your procedure (or some parts of it) in a list of numbered steps instead of in a continuous paragraph.
- Use sub-headings to identify main stages and steps in the procedure, especially if the description is long.

- Use appropriate visuals to enhance the clarity of some of the information. You may, for instance, sum up important parts of a procedure in a flowchart or schematic diagram, or use a table for some details.

## Activity 4.4

### Analysing the information components of the procedures section and practising how to organise them effectively

1. Choose either Task 1 (experimental study) or Task 2 (survey).

**Task 1**

Choose ONE of the following descriptions of procedure:

- The subsection under the subheading '**AFM tip and substrate coating/characterisation**' in the 'Materials and methods' section of 'Gold nanoparticles for cancer detection and treatment: The role of adhesion' [2] (available on the main course site).
- The description of the testing process in the 'Materials and methods' section of 'Analysis of All Terrain Vehicle Crash Mechanisms' [9] (available on the main course site), from the second paragraph which begins 'The testing process began by …' to the end of the section.

a. Identify the stages of the procedure, the steps in each stage and justifications (if any) for each step, putting these into a table or a flowchart.
b. What were some clues that helped you in your identification, and what can you learn from these clues?
c. For which steps have the authors provided an explanation or justification? Why?
d. What subheadings do you think the authors might have included, and how helpful do you think these might have been?
e. Do you think including visuals might have been helpful? If so, what visuals would you have included, and why?
f. What specific details did the authors provide, and why might these be important?

**Task 2**

Below are the parts of Example 3 that focus on the procedures used in both parts of the study that it came from — the focus group discussion, and the survey:

**Extract from Example 3**

Prospective participants in the focus group were selected from the contact database of the Australian Maritime College. Maritime experts in Australia and New Zealand … were contacted. An e-mail containing the project's background, objectives and methodology was then sent to all participants. Upon confirmation of acceptance, an eight-question questionnaire was sent to all participants ….

The responses of the participants were subsequently collated with author-related links removed, then synthesised and analysed into a single document. This was then sent around to all participants for their comments and additional inputs before being finalised. Upon completion of this process, the final version of the discussion analysis was devised. Based on this analysis, a detailed postal questionnaire (Appendix) was developed and sent around to participants again as a pilot study for their comments. It was then verified and finalised before being sent out to the international shipping community, together with a cover letter explaining the background and objectives of the study …

The design for the postal survey was decided through the analysis of the focus group discussion. … The sampling frame for this survey was chosen from the …. In an effort to increase the response rate for this postal survey, the questionnaire was also posted on the website of the AMC.

Extracted from [5]

a. Identify the stages of the procedure, the steps in each stage and justifications (if any) for each step, putting these into a table or a flowchart.
b. What were some clues that helped you in your identification, and what can you learn from these clues?
c. For which steps might the authors have provided an explanation or justification? Why?
d. What subheadings do you think the authors might have included, and how helpful do you think these might have been?
e. Do you think including visuals might have been helpful? If so, what visuals would you have included, and why?
f. What specific details do you think the author might have provided, and why might these be important?

2. The descriptions of procedure in both the reference papers available on the main course site ([2] and [3]) include visuals. Study the visuals used in relation to each description. What different purposes do they serve?

### Language focus

In Activity 4.4, you were asked what clues helped you to identify the stages, steps and justifications for steps in the procedures used. The clues might have included:

- **concrete action verbs in full sentences** that capture the main actions in the procedure;
- **non-finite 'to' clauses** (e.g., 'to maximise the AFM tip surface contact with the solution') and **non-action verbs** (e.g., 'This also *accounts* for batch-to-batch variations …') for (some) justifications;
- **paragraphing** to indicate different stages (i.e., generally, each new stage begins with a new paragraph);
- presentation of the stages and steps in **sequential order**; and
- **signal markers of sequence** to indicate new steps (e.g., *subsequently, then, After* …) and **signal markers of logic** to indicate an explanation (e.g., *in order to, because, since* …).

The third and fourth strategies (effective paragraphing and sequential order) are important aspects of organisation. The rest are the key language structures you can employ for an effective description. Notice especially how helpful signal markers are in guiding your reader when describing steps in a continuous paragraph.

In addition, also notice that most of the time, authors use the **past passive** to describe the steps in the procedure in order to keep the focus on the procedures rather than the doers, as in the following examples:

> A simple dip-coating method *was used* to … The bare AFM tips were *dip-coated* with … This was done by … The tips were then *air-dried* …
>
> Extracted from [2]

> After the machine *was weighed*, it *was secured* to the testing bed… Once all the ropes *were* correctly *attached*, the platform *was raised* …
>
> Extracted from [9]

> Prospective participants in the focus group *were selected from* … Maritime experts in Australia and New Zealand… *were contacted*. An e-mail containing the project's background, objectives and methodology was then *sent* to all participants.
>
> Extracted from [5]

# Activity 4.5

## Studying and using appropriate and effective language structures in describing procedures

1. Look at the description of procedures in any research report of your choice. This could include the examples we have used in this unit, as well as the descriptions in the two reference articles provided on the main course site.
   a. Use highlighters of different colours to identify the language structures described above.
   b. Does the description you have examined use all the structures described?

2. The following are descriptions of procedures extracted from past student FYPs. Re-write each one using more correct, appropriate and effective language. (You may also need to re-organise some information, add missing details or delete redundant information.)

a. In day 1, the two pump-filter samplers are placed in the Tutorial Room +45, while another two sets of devices are placed on the balcony outside LT19A. Install filters in the impactors of each sampler. Turn on the 4 pumps at the same time and let them run for about 20 hours.

   On second day, turn off the 4 pumps at same time. The pump on-and-off times are recorded. Open the impactor, use the clean tweezers to pick up the filter and use the testing tube to store the filter. In the end, a total of 4 individual sample filter are collected, 2 indoor samples and 2 outdoor samples.

   Extracted from [10]

b. In this study, ascorbic acid reduction method is used to produce AuNPs. Synthesis of AuNPs is adapted from the literature. [29-31] A series of experiments were carried out in order to achieve the AuNPs solution that can provide the best colorimetric sensing ability. Different colour of AuNPs solutions are resulted from different AuNPs sizes [32] and these are obtained by varying the chemicals and the process parameters are shown in Figure 10 and table 1. Different formulations and parameters were used in the synthesis to see their effect on AuNPs.

   Extracted from [11]

c. A container of 100 litres of water was provided to dose both Constructed Wetlands (CW) tanks for a period of four days. The container holds a total quantity of 100 litres of synthetic wastewater. The wastewater which contains IBU is mixed with the tap water to the desired volume required.

The synthetic wastewater stored in the container will be conveyed to the inlet of the CW tanks with the help of a water pump. The water pump will deliver the same flow rate of synthetic water to the respective CW which has preset settings of a flowrate equivalent to 0.0001273 liters per second. After the end of four days cycle, the volume of tank will be equivalent to the measured value mentioned above.

Given the consideration that the container may promote mosquito breeding, a mesh cover was introduced.

Extracted and adapted from [12]

## Activity 4.6
### Writing a Materials and Methods section

Work with your group. Choose *either* Task 1 (experimental study) or Task 2 (survey) to practise writing a Materials and Methods section.

**Task 1**

Choose a simple engineering or scientific experiment or test that *at least one of you* has carried out:

1. Make a list of the material and equipment used.
2. Share or discuss how the equipment was set up.
3. Recall the stages and steps taken in carrying out the experiment or test.

Write the Materials and Methods section of a report for this experiment or test, including visuals that you think are necessary or helpful.

**Suggested approach**: After a whole group discussion of the points to be included, divide the task of writing among your group, e.g., some members to write the materials section, some to write about the equipment set-up, and the rest to write the description of the procedure. Then combine your different parts, and work together to produce a final draft.

**Task 2**

Think of a questionnaire survey that you may carry out in relation to an engineering project. Discuss:

1. who your target participants may be,
2. what content your questionnaire would include (e.g., the sections you would include and the type of questions you would ask), and
3. the steps you would take in constructing the questionnaire, selecting your participants, and carrying out the survey.

(Alternatively, use similar information from a survey study that one of you has conducted.)

Now imagine that you have completed the study, and now have to produce the report. Write the methodology section, including visuals that you think are necessary or helpful.

**Suggested approach**: After a whole group discussion of the points to be included, divide the task of writing among your group, e.g., some members to write about the participants, some about the research instrument, and the rest to write the description of the procedure. Then combine your different parts, and work together to produce a final draft.

## Summary

In this unit, you have learnt about the role and importance of the Materials and Methods section of a research report. You have learnt about the kinds of information that you need to include in describing materials used, data sources, and procedures, when writing experimental and survey reports. You have also learnt about the language structures that you should use to produce appropriate and effective descriptions.

## Preparing for Unit 5

The next tutorial is on writing the Results and Discussion section of a research report. Please read through the unit before you come to class as the tutorial will focus on classroom activities. No class time will be given for reading.

**IMPORTANT**: The concluding activity in Unit 5 **(Activity 5.9)** requires you to come prepared with some material of your own. Read the instructions for Activity 5.9 to ensure that you are ready for it.

## References

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[10] Anon., "Indoor bioerosols – source, health impacts, and mitigation strategies," Final Year Project Report, School of Civil and Environmental Engineering, Nanyang Technological University, Singapore, 2014.

[11] Anon., "Real-time colorimetric biosensor for hydration imbalance in sports activities," Final Year Project Report, School of Materials Science and Engineering, Nanyang Technological University, Singapore, 2014.

[12] Anon., "Functions of plants for Ibuprofen removal in constructed wetlands," Final Year Project Report, School of Civil and Environmental Engineering, Nanyang Technological University, Singapore, 2014.

# Unit 5

## FYP reports: Results and discussion

## Introduction

For research-type FYPs, the 'Results and discussion' section of your FYP is the most important section of your report. Here, you present the outcomes of your research. This involves two aspects:

- **reporting** the key **results** or findings of your experiment or survey, and
- **discussing** and **interpreting** what these results mean in relation to your research questions or hypotheses.

In deliverable-type FYPs, it is usually desirable that you test the deliverable, experimentally or otherwise, and report the results in a Testing, Results, and Evaluation chapter or section. This unit therefore also applies directly to you. However, your chapter or section will be relatively short and much simpler than that in a research-type FYP report.

This unit highlights the kinds of information you should focus on when reporting and discussing or evaluating your results. It also explores the organisational strategies and language resources you can use to present your results clearly and convincingly to answer your research questions. As visuals play a key role in this section, the unit includes a section on how you should use them.

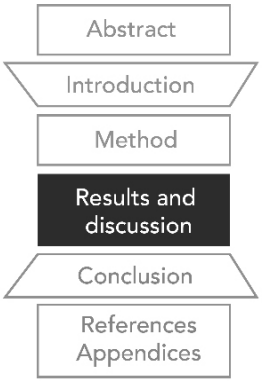


Figure 5.1: Structure of a research report – Results and discussion [1]

## Learning outcomes

After completing this unit, you should be able to:

1. understand how essential it is to report and discuss your research findings clearly and convincingly;
2. select appropriate informational details from your results to include in your findings;
3. discuss your findings systematically and persuasively to answer your research aims;
4. use effective organisational strategies and language structures to present and discuss your findings; and
5. incorporate visuals correctly and effectively to highlight significant trends from your results.

## Focus of the 'Results and discussion' section

In reporting the results or findings of your study and discussing them, keep this firmly in mind**: your ultimate goal is to answer your research questions, meet your research objectives, or confirm or reject your hypotheses**. Remember that your reader will constantly be looking for information and analysis that help to address the questions you started with, the objectives you outlined, or the hypotheses you proposed. You must convince your reader that the aims of your research have been achieved.

To do this, it is important that you present your results clearly and persuasively. You can achieve this through using visuals accompanied by textual explanation and discussion in a systematic, organised way. You can also use a range of conventional language features to draw attention to key facts and figures in your findings, make important cause-and-effect links, and highlight or emphasise important observations or points while making clear that other observations or points may be open to question.

## Activity 5.1

### Exploring further general principles for writing the Results and Discussion section

Use the table below to discuss with your group some general principles for content, organisation and language use that you would apply to guide your writing of the Results and Discussion section.

| Consideration | Principles/Guidelines |
|---|---|
| Your ultimate goal is to address your research questions, objectives or hypotheses. | |
| You should not make your reader do the work of looking through all your results and of making sense of them. | |
| At this stage of the report, your reader would have read your introduction, literature review, discussion of theory, and methodology. | |
| This is the most important section of your report! | |
| You have a word limit. | |
| (Other considerations that your instructor may raise, or that you can think of) | |

#### Information components

Essentially, in this section, you present **selected sets of results,** and **comment on each set** in relation to the research aims or questions. Because all research reports have a word limit, you may not be able to present all the results that you have obtained. You should therefore prioritise and include only **the most relevant and significant** sets of results.Typically, for each set of results, you should provide three information components. In the first two, you present the 'results', while in the third, you provide the 'discussion' aspect of this section:

*Component 1: Providing and making reference to a visual*

Use a visual to present the relevant facts and figures. You must then refer to it in writing indicating clearly the table or figure number, as you are likely to have many tables and figures in this section: your reader needs to know which table or figure is the focus of discussion at any point in time.

*Component 2: Describing important results*

Your description should highlight significant trends and patterns, as well as important details that you have observed in your results. It is through your description that you can 'animate' or give life and meaning to facts and figures by not just mentioning relevant numbers, but also giving a description in words (e.g., 'the overwhelming majority (80%)' instead of just '80% of the respondents').

*Component 3: Commenting on the results*

Your comments should provide an interpretation or analysis of your observations, with a view to providing answers to your research questions. Through, amongst other ways, sound explanations for your results, reasonable generalisations from your observations, and comparison with previous studies, you show your reader how you arrive at the conclusions of your study.

## Activity 5.2
### Identifying information components in the 'Results and discussion' section

Choose either Example 1 (Experimental study) or Example 2 (Survey).

Read the example and identify components 1, 2 and 3. What words or expressions are used to present these components?

**Example 1** (Experimental Study)

This extract is from a study that investigates the effect of different $H_2SO_4$ doses (0–2.5%) on three lignocellulosic feedstock materials, namely, pinewood (PW), timothy grass (TG), and wheat straw (WS) at the same temperature over the same duration of time. Before the three feedstock materials were treated with the $H_2SO_4$ doses, compositional analysis was performed on them to quantify the lignocellulosic components as well as the extractives and ash that make up each material. The extract presents the findings of this compositional analysis.

Table 1 gives the compositional analysis of the three lignocellulosic feedstock. The yield of extractives in PW, TG, and WS was 15.7, 16.5, and 19.2 wt%, respectively. The high amount of total extractives in WS indicated higher amount of water, ethanol, and hexane soluble components such as terpenes, terpenoids, tannins, resins, fats, waxes, lipids, proteins, and organic acids. PW, TG and WS represented 1.5, 1.3, and 1.1 wt% of ash content, respectively.

Table 1. Compositional analysis (in weight percent) of lignocellulosic feedstock

| Biomass | Cellulose | Hemicellulose | Lignin | Extractives | Ash |
|---|---|---|---|---|---|
| Pinewood | 38.8 ± 1.4 | 23.6 ± 0.8 | 20.4 ± 1.0 | 15.7 ± 0.6 | 1.5 ± 0.2 |
| Timothy grass | 34.2 ± 1.2 | 30.1 ± 1.0 | 18.1 ± 0.7 | 16.5 ± 0.8 | 1.1 ± 0.4 |
| Wheat straw | 39.1 ± 0.8 | 24.1 ± 0.6 | 16.3 ± 1.2 | 19.2 ± 0.8 | 1.3 ± 0.1 |

On the other hand, the cellulose concentration in the three feedstock components ranged between 34.2 and 39.1 wt%, with WS demonstrating highest levels. The hemicellulose levels were highest (30.1 wt%) in TG and lowest (23.6 wt%) in PW. Similar results on high hemicellulose contents (26–32 wt%) have been reported from reed canary grass and switchgrass [22]. This was due to the fact that fast-growing plants are abundant in hemicellulose that aids in conducting and concentrating tissue for mineralized solutions rich in sulphates, chlorides, nitrates and silicic acid in plants [23]. The holocellulosic (cellulose

and hemicellulose) composition in the three feedstock samples was in the range of 62.4–64.3 wt% indicating higher structural carbohydrate (sugar) levels. PW showed utmost levels of lignin (20.4 wt%) compared to those of herbaceous biomasses (16.3 and 18.1 wt%), which is in accordance with various authors [24, 25].

Extract from [2]

**Example 2** (Survey)

This extract is from the Results and Discussion section of the same study as Example 3 in the previous unit. The authors wanted to use their study as a basis for developing an improved global maritime safety management system (MSMS), and one aspect of this was to identify the key players who should be consulted in the formulation of the system. Recall that their study involved first a focus group discussion, and then a questionnaire survey based on the discussion. The extract follows immediately after an account of the focus group discussion, and presents the findings of the follow-up survey.

VTS managers were the most important players in the global MSMS (mean response = 4.83). Pilots were also perceived as the second most important players in the MSMS with the mean response of 4.81. Table 3 indicates the importance of key players in the global MSMS.

Table 3: The importance of key players in a global MSMS

| Key players | Mean | Standard deviation | Rank |
|---|---|---|---|
| VTS managers | 4.83 | 1.51 | 1 |
| Pilots | 4.81 | 1.42 | 2 |
| Port authorities/Harbour masters | 4.79 | 1.59 | 3 |
| Tug and towage providers | 4.45 | 2.15 | 4 |
| Port and terminal operators /Stevedoring companies | 4.30 | 2.50 | 5 |
| Ship and cargo agencies | 3.57 | 2.93 | 6 |
| Marine environmental managers | 3.47 | 2.33 | 7 |
| Independent contractors (mooring, security, etc.) | 3.32 | 2.35 | 8 |
| Marine surveyors and consultants | 3.30 | 2.33 | 9 |
| Port worker unions | 3.04 | 2.90 | 10 |
| Regional councils | 2.96 | 2.60 | 11 |
| Fishing industry | 2.92 | 2.89 | 12 |

Note: relative ranking based on factors' mean scores; 1= not at all important, 5= very important

There are also some other considerations with regard to the respondents' perceptions on the key players in the global MSMS. First of all, as expected, the ship and cargo agencies were viewed as some of the important players in such a safety system with a mean score of response of 3.57, confirming the finding from the focus group discussion. Secondly, regional councils and fishing industry received a mean score of response lower than three ('neutral'), thus their role in a global safety system like MSMS is questionable. It is therefore reasonable to conclude that, with the exception of the regional councils and fishing industry, all other key players identified in the focus group discussion are supported by the survey of international shipping community and perceived as important to be included in the global MSMS.

Extracted from [3]

Each of the three information components will now be discussed further, with activities to explore what you should or can do, and what language structures you should or can employ.

## Component 1: Providing and making reference to a visual

### The visual

The types of visuals you can use include **tables**, **charts** and **graphs** (for both experimental as well as survey-type studies), as well as **schematics**, other types of **diagrams**, and **photographs** (for experiments, tests and observational studies).

In most types of engineering studies, such visuals are crucial in presenting results because they:

- present the hard evidence from your experiments or surveythat your readers can examine for themselves,
- provide such evidence in a selective way so that your readers do not need to examine the detailed raw data, and
- give 'shape' to the data you have obtained to enable your readers to see what the results can mean.

A well-designed visual, in other words, is an important part of the 'argument' for your study.

First, however, here are some **basic** rules, conventions and guidelines for you to observe when using visuals:

*Tables and figures*

- Anything that is not a table must be labelled as a **figure**.
- The Table of Contents in your report should have only two lists: a **List of Tables** and a **List of Figures**.

*Insertion of visuals*

- All tables and figures placed within the text must be referred to. Insert them only after you have mentioned them in your text.
- Do NOT include any table or figure that is not discussed in the text. Tables providing detailed raw data of individual replicated trials should be placed in an appendix.

*Titles*

- Titles for **tables** should be placed **above** the tables, while titles for **figures** should be placed **below** the figures.
- All titles should be **centre-aligned** and **numbered in the order that they appear**.
- Tables and figures should be **numbered separately**, e.g., if a table appears first, followed by a figure and then a table, the labelling of the visuals should be in the sequence: Table 1, Figure 1, Table 2.
- Titles for visuals should be insightful: each title **should reflect the key point made in the visual**. Table 1 from Example 2 aims to show who the key players are in a global maritime safety management system (MSMS), in order of importance. The title reflected this explicitly.

*Labelling of visuals*

- **All cells** in a table or axes in a figure must be **clearly labelled. Units of measure** should be included.
- **If more than one data set** is represented in the figure, you should **include a legend or key** that allows your audience to relate the figure to your data set.

Beyond these basic guidelines, you need to choose the type of visual that best suits what the set of results shows. A well-chosen and well-designed visual not only reflects how well you sorted out the information and made sense of it, but also sends a clear 'message' to your reader.

## Activity 5.3
### Choosing appropriate visuals to present your results

1. As a group, use the table below to discuss when you would use each type of visual to present your results. Some examples have been filled in for you. Look up examples from the results section of some research papers for ideas. (For experimental studies, you can start with the two reference articles provided on the main course site, as well as other examples in this unit. For surveys, you can start with Example 2 and look up the study from which it is taken.)

| Type of visual | Use |
|---|---|
| a. Table (Experiments, Survey) | • To show the ranking of factors studied (e.g., in terms of mean scores, as in Example 3, or in terms of frequency). |
| b. Charts (Experiments, Survey) | • **Pie-chart** to show proportion (e.g., which element or group dominates). |
| c. Graphs (Experiments, Survey) | • To show upward or downward trends. |
| d. Schematics (Experiments, Tests & Observational Studies) | • |
| e. Other kinds of diagrams | • |
| f. Photographs | • To capture changes to a physical object after experimental application of a substance. |

2. **Optional**: Look at Figure 5, as well as Tables III and IV in the reference article 'Gold nanoparticles for cancer detection and treatment: The role of adhesion' [4] (available on the main course site). Figure 5 presents the same findings as the two tables combined.

Why have the authors presented the same information in different visuals? (To understand this, look for where each visual is referred to in the text, and read what is described and discussed.)

#### Referring to the visual

If you include a visual, you must refer to it in your writing. Otherwise you leave your reader wondering why the table or figure is there, or to which part of your discussion it refers to. Indicate clearly the table or figure number, so that your reader knows which visual is the focus of discussion. The simplest way of referring to a visual is through a short phrase or clause such as *as shown in Figure 2* or *From Table I, it can be seen that …*, or adding a simple directive in brackets — e.g., (see Table 1) — at the end of the description of results (Component 2). Another way is to use a full sentence, e.g., *Table 4 shows the mean ratings of perceived convenience of each proposed charging locations*.

# Activity 5.4

## Analysing informational content and language use in referring to visuals

1. Make a list of short, standard phrases or clauses that you can use for referring to visuals, drawing on those you are familiar with or by looking for examples in published research articles. Check to make sure that each phrase or clause in your list is accurately worded and appropriate, either by consulting a dictionary or grammar reference, or by consulting your instructor.
2. Below are examples of sentences used to refer to visuals:

   i. Table 1 gives the compositional analysis of the three lignocellulosic feedstock [2].
   ii. Table 3 indicates the relative importance of different key players in the global MSMS [3] (with slight adaption).
   iii. Figure 4 shows a typical force-displacement plot for the adhesion between gold nanoparticles and LHRH [4].
   iv. Figures 6-8 reflect increased adhesion forces, when compared with those of gold [4].
   v. As for thrust effects, Table 2 demonstrates that the ATV lifted off the ground much further than the UTV – with an almost 9-inch difference [5] (with slight adaptation).
   vi. The mean ratings for perceived convenience of the ten proposed charging stations are presented in Table 3.2 (invented example).
   vii. Figure 3 shows that both BEV users and interested non-users prioritise motorway service stations and gas stations as important locations for fast-charging stations [6].
   viii. Table 2 describes 2012 fatal crash data for distraction-affected crashes by driver age [7].

   a. What do you notice to be common about the verbs in all the examples?
   b. What other similar verbs can you think of for the referring sentence?
   c. Every example specifies the exact table or figure. What does the rest of the sentence do in each case?

3. When do you think it is better to use a short referring phrase or clause? When do you think it is better to use a full sentence? In discussing this, you may find it useful to examine Example 3 below.

**Example 3**

Figure 4 shows a typical force-displacement plot for the adhesion between gold nanoparticles and LHRH. This plot has characteristics similar to the idealisation presented in Figure 2. By multiplying the pull-off deflections with the tip stiffness shown in Table II, the pulloff forces were obtained. There were no measurable forces for the control samples.

Extracted from [4]

## Component 2: Describing important results

The visuals you present should capture the most important sets of findings from your investigations, in relation to your research aims and questions. It is not enough, however, to just present bare facts and figures and expect your reader to work out what answers they provide. You need to help your reader to see these answers. This is why you need to then describe your results in words.

This means that you should not just report all the quantitative data in your tables and figures blandly and indiscriminately. Your description should:

- highlight only significant trends and patterns, as well as outstanding or important details that mean something in terms of answering your research questions; and
- inject qualitative verbal descriptions of these trends, patterns and details to indicate or suggest why they are significant.

# Activity 5.5
## Analysing informational content and language use in describing the results

1. Examine closely the descriptions of important results in Examples 1 and 2 (used in Activity 5.2), and, if possible, in the two reference articles provided on the main course site or in other published research reports.
   a. What types of details do they highlight?
   b. What other types of details do you think should or can be highlighted?

2. Compare the two passages below.
   a. What tense(s) is(are) used to describe the main results in both passages?
   b. Is the active or passive voice used to describe the results?
   c. Compare your observations of these two passages with other descriptions of results (e.g., those in the two reference articles on the main course site, or in other examples in this unit). Do the same observations still hold?
   d. What can you conclude about the use of tenses and active or passive voice when describing results?

**Example 4**

Figure 1 illustrates the sugar yields from PW, TG, and WS as a result of different $H_2SO_4$ concentrations ranging from 0% to 2.5% and enzymatic hydrolysis (denoted as 'E' in the figure). Enzymatic hydrolysis resulted in higher sugar yields within all feedstocks than the dilute acid pre-treatment. Respectively, enzymatic hydrolysis resulted in an increase of 66.5%, 65.7%, and 60% total sugar (glucose and xylose) yield in PW, TG, and WS.

Extracted from [2]

**Example 5**

Table 2 describes 2012 fatal crash data for distraction-affected crashes by driver age. Ten percent of all drivers 15 to 19 years old involved in fatal crashes were distracted at the time of the crashes. This age group is the group with the largest proportion of drivers who were distracted.

Extracted from [7]

3. The following examples report findings with and without qualitative verbal description. What difference does including the qualitative description make to you as a reader?

**Example 6a** (from an experimental report)

*With qualitative description (Original):*

...the cellulose concentration in the three feedstock components ranged between 34.2 and 39.1 wt%, with WS demonstrating highest levels. The hemicellulose levels were highest (30.1 wt%) in TG and lowest (23.6 wt%) in PW.

Extracted from [2]

*Without qualitative description (Amended):*

... the cellulose concentration in the three feedstock components was 34.2 wt% for TW, 38.8% for PW, and 39.1 wt% for WS. The hemicellulose levels ranged from 30.1 wt% in TG and 24.1 wt% in WS, to 23.6 wt% in PW.

**Example 6b** (from a survey report)

*With qualitative description (Original):*

VTS managers were the most important players in the global MSMS (mean response = 4.83). Pilots were also perceived as the second most important players in the MSMS with the mean response of 4.81.

Extracted from [3]

*Without qualitative description (Amended):*

VTS managers ranked first in the global MSMS (mean response = 4.83). Pilots ranked second with the mean response of 4.81.

4. Choose either Task 1 (experimental report) or Task 2 (survey report).

**Task 1** (Experimental report)

Study the descriptions of results in the two reference articles (available on the main course site), and find as many instances of qualitative descriptions as you can.

From this, make a list of useful words, phrases and expressions that you may use to describe quantitative data.

**Task 2** (Surveys)

Below are some variations for reporting the same result from a survey:

i. 53% of the respondents agreed that ...
ii. Slightly over half of the respondents (53%) agreed that ...
iii. More than half of the respondents (53%) agreed that ...
iv. A majority of the respondents (53%) agreed that ...

Make a similar list of different descriptive phrases for another possible quantitative result from a survey, and discuss what differences in effect they may have.

## Component 3: Commenting on the results

When reading your description of results, readers will naturally have at the back of their minds questions such as 'So what?' or 'Why?'. They will want satisfactory answers to such questions. You therefore have to interpret or explain the results to the reader in a convincing way. This is what this component is about.

**Informational content in commenting on the results**

There are three common inter-related ways that you can comment on the results. You can:

- **explain** the reasons for the results;
- **generalise** from the results; and/or
- **compare** your results with past findings by other researchers.

*Explaining reasons*

The most common way to discuss the results of your research is to highlight the cause and effect relationships between the variables manipulated. Your explanation may also draw on comparisons with similar past research, and is likely to be based on existing knowledge. Such an explanation may, for instance, help to confirm or cast doubt on a hypothesis, and hence contribute to addressing your research aims.

*Generalising*

When your data reflects a general pattern, you may be able to generalise from this pattern as a step towards answering your main research questions. You should only attempt a generalisation when there is a clear pattern, and you must make sure that the generalisation is logically sound. You can also strengthen the claims of your generalisation by providing corroboration from previous studies.

*Comparing your results*

Research is meaningful when it advances current knowledge about the particular area of research you are doing. You often need to situate your results in published literature by comparing your results with past findings by other researchers. If your results are similar to past research, you can cite past research to confirm your findings. If your results are not similar to past research, you have to provide possible reasons to explain why your results were not similar.

Note that dissimilar results are not always a bad thing. Further investigation might reveal that you are onto a new discovery.

## Activity 5.6

### Identifying the types of comments used

Identify the types of comment used in commenting on the results below.

**Example 7**

The adhesion forces between the gold nanoparticles and LHRH and between gold nanoparticles and BSA are comparable and stronger than those obtained for paclitaxel-gold, paclitaxel-antibody or paclitaxel-LHRH complexes. This suggests that the robustness of such systems will depend highly on the drug-component interactions. The adhesion forces above are generally related to Van der Waal's forces, with relatively large and short range interactions between the different components. Similar results were obtained for LHRH interactions. The current results, therefore, confirm that thiols can improve the robustness of gold nanoparticle clusters, as is expected from prior work reported in the literature [41, 42].

Adapted from [4]

**Example 8**

Most participants indicated that they would purchase similar vehicles with Adaptive Cruise Control (ACC) again, which suggests that ACC owners have a positive attitude towards the system. The willingness to re-purchase a vehicle with ACC was also associated with higher ACC use while distracted or impaired. Llaneras (2006) indicates that ACC users think more highly of ACC when they are confident that the system can maintain safe headways, and perhaps the variable, willingness to repurchase, is picking up some of those perceptions. The connection between safety and trust has previously been suggested by Lee et al. (2006) and Llaneras (2006), but the data available for this study do not provide as strong an evidence for this connection. That said it is a link that will have an impact on user acceptance and should be examined further.

Extracted from [8]

### Language use in commenting on results

In most of the examples you have seen so far, you may have noticed that when describing the results, the authors may use either the past tense or the present tense, depending on the circumstances. Notice that when the authors comment on the results, the dominant tense is the **present tense**, with the past tense likely to be used mainly for explaining what may have happened, e.g., during an experiment, or why participants responded in a particular way. The dominant use of the present tense is because most of the comments relate to the significance of the findings for now, or in relation to a general 'truth'.

In explaining reasons for the results, you would also need to use the language of reasoning skilfully to make explicit cause-and-effect links. **Cause-and-effect words and phrases** such as because, due to, consequently, this leads to, this accounts for help you to provide clear explanations for results.

In making generalisations from trends and patterns, you can use a range of **'signal' words and phrases to prepare** your reader for each generalisation. Two examples are: All this indicates that (+ generalisation), … leading us to conclude that (+ generalisation). Keep a lookout for other examples of how experienced authors do this.

Quite evidently, when comparing with previous studies, you often have to use the language of **compare and contrast**. Some obvious examples include expressions such as Similarly …, as also (reported by) …, In line with … (for similarity), and in contrast to, unlike (xxx's findings), However (for contrast).

Beyond these basic features, one very important area of language use you should pay attention to is the use of **hedges** and **boosters**. **Hedges** are words and expressions that soften or tone down: they are often used to express tentativeness and less certainty. **Boosters**, on the other hand, are words and expressions that add force or emphasis: they are often used to assert a point strongly or to draw attention to it. The table below provides some examples of hedges and boosters:

| Hedges | Boosters |
|---|---|
| Hedging clauses: *It appears that …, It is likely that …, It seems that …* | Boosting clauses: *It is certain that …, It is clear that …, It is obvious that …* |
| Reporting verbs: *The results indicate/suggest …* | Reporting verbs: *The results demonstrate /prove/show that …* |
| Modal adjectives/adverbs: *generally, likely, possibly, probably, (very) often* | Modal adjectives/adverbs: *always, certainly, definite/definitely, in all cases* |

| **Modal verbs:** *can, could, may, might* | **Modal verbs:** *must, will* |
|---|---|

Note that hedges and boosters express different degrees of certainty. Some hedges express great uncertainty (e.g., might possibly) while others express only some uncertainty (e.g., It is likely that …, where the uncertainty may just be due to caution). Not using any hedges (e.g., X is Y) asserts certainty, while boosters reinforce and emphasise the author's certainty.

Using hedges and boosters (or not using them) accurately to reflect the 'facts', and skilfully to express your judgment, is an important key to a persuasive and convincing discussion of your findings, and the next activity focuses on this.

## Activity 5.7
### Exploring the use of language in commenting on results

Read the passages below and identify the types of comment made. Then fill in the blanks with an appropriate verb in the correct tense, or with an appropriate phrase (cause-effect, compare-contrast). In most cases, a clue has been given to you in brackets after the blank.

Consider in each case whether to use a hedge, a booster, or neither a hedge or booster.

After you have finished and checked your answers, try changing your use of hedges and boosters for some of the blanks. How does this change the impact of the comments?

(If time permits, or as an alternative to this exercise, experiment with changing the use of hedges and boosters in Examples 7 and 8 from Activity 5.6, and consider the impact of these changes.)

**Example 9** (from an experimental report)

The adhesion force between thiol and gold is found to be almost double that between the gold and the BSA. These results _____ a significant increase in the adhesive interactions when thiol is introduced between the gold and BSA. The increased adhesion forces between gold and thiol _____ (attributed to / result of) covalent bonds. Gold _____ known to form stable complexes with ligands which have 'soft' or polarizable electron donating atoms such as phosphorus or sulfur [40].

The above results _____that, with the exception of thiol-taxol interactions, the interactions between thiol and the other chemical species (LHRH, EphA2 and gold) _____ (cause-effect verb/phrase) increased adhesion. The observed increase in adhesion forces (in the presence of thiols) _____ (effect-cause verb/phrase) the effects of secondary bonds (Van der Waals forces or hydrogen bonds). Furthermore, the statistical variations in the measured adhesion forces _____ less in the cases where the number of molecular species on the AFM tips is fewer. However, in cases with increased numbers of available molecular species on the AFM tips (taxol and LHRH), the variabilities in the measured adhesion forces _____ (depend) the coverage of the AFM tips and the orientations of the molecules on the AFM tips and the substrates.

Extracted from [4]

**Example 10** (from a survey report)

Distracted driving, particularly texting, _____ (cause-effect verb/phrase) a reduction in safety and a negative impact on traffic flow given greater fluctuations in speed and longer response times to critical events (Stavrinos et al., 2013). _____ (hedge/booster or neither) drivers become more reliant on Adaptive Cruise Control (ACC) to help them maintain constant speed and to automatically brake for a closing lead vehicle. With greater system use, drivers _____ (hedge/booster or neither) also feel they are more aware of system limitations (Larsson, 2012) and _____ (hedge/booster or neither) feel they

can appropriately adapt. However, sudden events cannot be anticipated and the ACC system _____ (be not) handle all such events.

Extracted from [8]

## Overall organisation of the 'Results and discussion' section

There are two ways of organising your results and discussion section or chapter. You can use:

- the **alternating** pattern; or
- the **sequential** pattern.

In the **alternating** pattern, you present a set of results and then discuss or comment on it before presenting the next result and discussing or commenting on it. In other words, you present a series of the Component 1-2-3 cycle, all under one heading 'Results and Discussion', as follows:

| Results and discussion | |
|---|---|
| Results 1 | Component 1 – present and refer to a visual of the data<br>Component 2 – describe the important results |
| *Discussion* | Component 3 – comment on results 1 |
| Results 2 | Component 1 – present and refer to a visual of the data<br>Component 2 – describe the important results |
| *Discussion* | Component 3 – comment on results 2 |
| Results 3 | Component 1 – present and refer to a visual of the data<br>Component 2 – describe the important results |
| *Discussion* | Component 3 – comment on results 3 |

Etc.

Possible summary of discussion points

This pattern is preferable if you have many results and you have specific comments on or discussions of each of these results.

In the **sequential** pattern, you present all your results together and then follow this with a discussion of all the results. You can do this under one heading 'Results and discussion' or under two headings, 'Results' and 'Discussion'. In other words, you structure your writing as follows (for one heading):

| Results and discussion | |
|---|---|
| Results 1 | Component 1 – present and refer to a visual of the data<br>Component 2 – describe the important results<br>*(+ incidental comments)* |
| Results 2 | Component 1 – present and refer to a visual of the data<br>Component 2 – describe the important results<br>*(+ incidental comments)* |
| Results 3 | Component 1 – present and refer to a visual of the data<br>Component 2 – describe the important results<br>*(+ incidental comments)* |

Etc.

Discussion Component 3 – comment on results 1, 2 and 3

This pattern is better when you have several different results to which one discussion can apply. By using this pattern, you will avoid repeating the same explanation or comment for the results.

## Activity 5.8
### Understanding which pattern of organisation to use when discussing results

Compare the two passages below and identify the pattern of organisation used to discuss the results of the research. Explain why these passages are organised differently.

**Example 11**

The adhesion forces between the gold nanoparticles and LHRH and between gold nanoparticles and BSA are comparable and stronger than those obtained for paclitaxel-gold, paclitaxel-antibody or paclitaxel-LHRH complexes. The weakest adhesive interactions within the drug nanocomposite systems are with the drug (paclitaxel). These interactions result in pull-off forces of about 10 nN, compared to those without the drug (F ~ 58 nN). This suggests that the robustness of such systems will depend highly on the drug component interactions. The adhesion forces above are generally related to Van der Waal's forces, with relatively large and short range interactions between the different components.

Also, it can be observed that similar adhesion forces were obtained for the LHRH and BSA coated tips when measured against the same substrate (~ 60 nN against gold and ~ 10 nN against paclitaxel). This may be due to the amino acid sequence present in the peptide and polypeptide structures in the LHRH and BSA, respectively. The overall adhesion forces would, therefore, depend on the charge distributions and positions of the amino acid residues in the peptide and polypeptide structures of the LHRH and BSA structures.

Extracted from [4]

**Example 12**

Similar results were obtained for LHRH interactions. These resulted in a three-fold increase in the adhesion forces of gold-thiol structures, when compared with those of uncoated gold structures (Figure 7). Furthermore, the adhesion forces between gold and paclitaxel are about six times greater when thiols are present (Figure 8). The current results, therefore, confirm that thiols can improve the robustness of gold nanoparticle clusters, as is expected from prior work reported in the literature [41,42]. The current results are also presented in Table VI. The above results suggest that, with the exception of thiol-taxol interactions, the interactions between thiol and the other chemical species (LHRH, EphA2 and gold) generally result in increased adhesion.

Extracted from [4]

## Activity 5.9
### Practise describing and discussing results

**Pre-lesson preparation**

As a group, choose one set of results from a published research study that at least one member of the group is familiar with. This set of results should be in the form of a TABLE.

Bring copies of this table for every member of the group to class. You will use this table to practise describing and discussing results.

Familiarise yourself with the study by reading at least the abstract, or getting the members who are familiar with the study to brief the rest of the group. Better still, read the whole article to understand it fully.

**During the lesson**

Work together to write a description and discussion of the results in about 300 to 350 words, incorporating all three components of information you have learnt about.

Do NOT refer to the original description in the article you have taken the results from, but bear in mind the study's research aims and questions. You may, if you wish, write based on different research question or aims, but using the same set of data.

If time permits, exchange your Results and Discussion with another group and evaluate each other's work. To do so, be sure to make clear to the other group the research aims and objectives for your results.

## Summary

In this unit, you have learnt how to structure the 'Results and discussion' section in a research report. You have also learnt what information to focus on in describing your results, what kinds of comments you can make in your discussion, and how to use appropriate and effective language structures in your description and discussion. In addition, you have learnt about the important role of visuals in presenting the results.

## Preparing for Unit 6

The next tutorial focuses on writing the Conclusion and Abstract. Please read this unit before class as the tutorial will focus on classroom activities. No class time will be given for reading.

## References

[1] J. M. Swales, *Genre Analysis: English in Academic and Research Settings*. Cambridge, UK: Cambridge University Press, 1990.

[2] S. Nanda, A. K. Dalai, and J. A. Kozinski, "Butanol and ethanol production from lignocellulosic feedstock: Biomass pretreatment and bioconversion," *Energy Science and Engineering*, vol. 2, no. 3, pp. 138–148, 2014.

[3] I. V. Thai, and D. Grewal, "Maritime safety management system (MSMS): A survey of the international shipping community," *Maritime Economics & Logistics*, vol. 8, no. 3, pp. 287–310, 2006.

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[6] R. Philipsen, T. Schmidt, J. van Heek, and M. Ziefle, "Fast-charging station here, please! User criteria for electric vehicle fast-charging locations," *Transportation Research*, *part F*, vol. 40, pp. 119-129, 2016.

[7] National Highway Traffic Safety Administration, "Distracted driving," DOT HS 812 012. Available: www.nhtsa.gov April, 2014.

[8] Y. Q. Wu and L. N. Boyle, "Drivers' engagement level in Adaptive Cruise Control while distracted or impaired," *Transportation Research, Part F*, vol. 33, pp. 7–15, 2015.

# Unit 6

## FYP reports: Conclusion and Abstract

## Introduction

This unit has two parts. The first part (Part A) focuses on writing the Conclusion section or chapter, which is the last major part of your report. The second part (Part B) focuses on writing the Abstract, which appears at the beginning of the report.

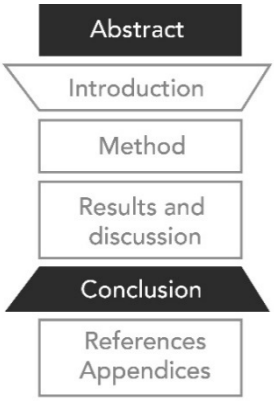



Figure 6.1: Structure of a research report – Abstract and Conclusion [1]

## Learning outcomes

After completing this unit, you should be able to:

1. identify the information components of the Conclusion and Abstract;
2. organise information in the Conclusion and Abstract;
3. use language structures that are typical of the Conclusion and Abstract; and
4. write a Conclusion and Abstract by applying the appropriate structure, information components, and language features.

## Part A: Writing the Conclusion

The main purpose of the Conclusion is to bring together the different sections of the report and to provide appropriate closure. In this section, you stand back from your study and evaluate your work on the basis of your findings or results and indicate whether the objective of the study has been met. In terms of organisation of information, the Conclusion is the reverse of the pattern used in the Introduction of the report, progressing from specific to general.

### Information components in the Conclusion

The following are the information components typically found in the Conclusion section or chapter:

**Component 1**: Restatement of objective and methodological approach of study
**Component 2**: Review and explanation of key findings
**Component 3**: Implications of research findings (point out practical applications of study)
**Component 4**: Limitations of study
**Component 5**: Recommendations for future research

*Component 1: Restatement of objective and methodological approach*

At the beginning of the Conclusion, briefly restate your research objective and methodological approach. When restating your objective, avoid reproducing it exactly as written in the Introduction. You could start with these expressions: As mentioned earlier or to reiterate, etc.

*Component 2: Review and explanations of key findings*

Summarise and review your most important findings in relation to your research question. State whether your objective was met or whether your findings support the original hypothesis.

You can also give possible explanations for your findings. If your results are unexpected, give reasons to explain them. You could compare your results with previous research, especially if you are replicating an experiment that has been conducted before.

*Component 3: Implications of research findings*

Evaluate the significance of your findings. This would answer the 'so what' question for your readers. You can point out the significance of your findings for theory and research development as well as the practical applications of your study.

*Component 4: Limitations of research study*

In this part of the Conclusion, any limitations of the study which restrict the extent to which the findings can be generalised should be stated. For example, if unforeseeable and inevitable problems were encountered during your experiment, these could be mentioned in the Conclusion. The limitations are not about the weakness in the research, but what cannot be concluded from your study.

*Component 5: Recommendations for future research*

Arising from the limitations of your study, you may see a need for further research. In addition, while working on your project, you may have realised that there are certain aspects of the project that would be interesting to research on though they lie outside the scope of your present project. You may wish to include this information here for other researchers who wish to work in these related areas of research.

The sequence above is the usual sequence for presenting the information components in the conclusion. However, not have all the elements have to be present. Recommendations for future research and applications of your research are optional and only one may be included to provide closure.

## Activity 6.1
### Analysing a Conclusion

The following is the Conclusion section from a research report. The problem studied was how to evaluate several control methods used to reduce particle emissions during 3D printing. Read the section carefully and then determine the information component each sentence represents. (The sentences are numbered for easy referencing.)

1 [1]This study evaluated the particle emission characteristics of various types of filaments in an exposure chamber under two different temperature conditions. [2]Furthermore, we attempted to develop an effective control method to reduce particle emissions during 3D printing.

1 [3]Several different control methods were tested, and the effectiveness of nanoparticle removal during 3D printing was evaluated. [4] The study was conducted in a nonstatic chamber 2.5 m3 in volume, with constant airflow supplied into the chamber by a fan. [5]A high-efficiency particulate air (HEPA) filter and activated charcoal filter (ACF) were installed and a fan provided a steady airflow of 0.1 m/s into the sampling chamber throughout the entire experiment.

[6] The HEPA filter was the most effective filter (removal effectiveness: 99.95% for ABS and HIPS under the manufacturer's recommended conditions) for removing nanoparticles during 3D printing in this study. [7] The use of an enclosure with a high-efficiency filter can decrease the concentration of particles emitted during 3D printing. [8]When an enclosure is used and the correct filter is attached to the enclosure ventilation of the 3D printer, nanoparticles can be effectively removed. [9]This study supports findings by [20] that the use of an enclosure with an appropriate filter (e.g., HEPA filter) could eliminate the nanoparticles emitted during FDM 3D printer operation. [10]Furthermore, the particles emitted during 3D printing were primarily nanosized particles under both manufacturer-recommended and consistent-temperature conditions for all seven filament materials tested. [11]These results suggest that manufacturers should consider measures to control nanoparticle emissions during the design and manufacturing of both 3D printers and filaments.

[12] One limitation was the lack of a control method suitable for open-type 3D printers. [13]Although the 'enclosure with ventilation fan (ACF)' method had no enclosure, it was equipped with a filter attached to an extruder suction fan, and the number concentration was still higher than that for the reference condition with no control method. [14]An effective control method for open-type 3D printers should be developed in future studies. [15]For example, a more elaborate suction fan surrounding the extruder nozzle might be used. [16] We recommend using 3D printers only in well-ventilated indoor environments with open windows and local ventilation systems. [17]Before the further growth of the 3D printing industry, manufacturers should consider standards and guidelines to protect the health of users by designing or applying preventive control methods such as pollutant-isolating enclosures and filter-based ventilation.

Adapted from [2]

## Activity 6.2

### Analysing and comparing conclusions

Read the Implications and Conclusion sections of the article 'Gold nanoparticles for cancer detection and treatment: The role of adhesion' available on the main course site and answer the following questions.

1. Can you identify the 5 components in the Conclusion section in this article? Do you notice any difference in the way information components in the Conclusion are presented in this article and in the research report you analysed in Activity 6.1?
2. Why do you think the author has a separate section for Component 3 entitled Implications in this article?

## Language focus

In this section of the unit, we examine the language structures typically used to present information in the different components of the Conclusion. The language structures discussed here are verb forms and modal verbs.

### Verb forms

Verb forms in the Conclusion vary depending on the type of information being presented. Guidelines on using verb forms in the different components of the Conclusion are given in the following table.

Table 6.1: Verb forms used in the components of the conclusion

| Function | Verb forms | Example |
|---|---|---|
| Restating aim (*Component 1*) | Simple past/present perfect | This research attempted to assess two methods for air purification. Or: This research *has attempted* to … |
| Restating hypothesis (*Component 1*) | Simple past | It *was* originally assumed that … |
| Review findings (*Component 2*) | Simple past | It *was* found that …<br>The experiment showed that … |
| Explain/compare findings (*Component 2*) | Simple present | The results are consistent with …<br>The findings differ from those of … |
| Implications of findings (*Component 3*) | Simple present | This research *adds* to the body of knowledge …<br>These findings *provide* evidence/lend support to the assumption that … |
| Limitations of study (*Component 4)* | Simple present | The small sample *size* is a limitation of the research. |
| Recommendation for future research (*Component 5*) | Simple present | The small sample size *is* an opportunity for future research. |

### Modal verbs

Modal verbs are another language resource that can be used in the Conclusion. The most common modal verbs used here are *can, could, may, might, will, would, should, must,* and *need to*. Modal verbs are used to indicate the degree of certainty with which a statement is made.

## Activity 6.3

### Evaluating the degree of certainty of statements

In making statements about the outcomes of your research, it is necessary to qualify their degree of certainty. Compare the following statements and rank them in order of degree of certainty with 1 being the most certain.

| Rank | Statements |
|---|---|
| 1 | a. The damage was caused by heat exposure. |
| 3 | b. The damage could have been caused by heat exposure. |
| | c. The damage might have been caused by heat exposure. |

| | |
|---|---|
| | d. The damage may have been caused by heat exposure. |
| 2 | e. The damage must have been caused by heat exposure. |

## Activity 6.4
### Identifying language structures in a conclusion

1. Read the experimental report in Activity 6.1. Identify the verb forms and modal verbs in the report and underline them.
2. Can you identify the typical expressions used to express the different components? Make a list of these expressions. Be prepared to share your list with the class.

Table 6.2: List of typical expressions in Conclusion section

| Component | Typical expression |
|---|---|
| 1: Restatement of objective | |
| 2: Review of findings | |
| 3: Implications of findings | |
| 4: Practical or theoretical applications | |
| 5: Limitations of study | |
| 6: Recommendation for future research | |

## Activity 6.5
### Writing a Conclusion

In groups of 4 or 5, use the notes below from a research report on distracted driving [4] to write the Conclusion section (300-350 words).

**Notes**

*Objective:*

- To identify the main cause of distracted driving in Singapore through a survey (100 drivers).

*Summary of findings:*

- Distracted driving – many forms; main type – smartphone usage
- Survey findings: 83% of drivers admitted to using mobile phones without hands-free kits in past 12 months; drivers are aware of danger but believe they can multi-task; findings similar to earlier studies conducted - Tong (2011); Samsung (2013); Oh (2013)

*Implications of findings:*

- Stronger prevention measures needed – tougher legislation; education and publicity campaigns

*Limitations of study:*

- Findings not backed by Singapore police traffic data for distracted driving offences during period covered by survey

*Recommendation for future research*

- Larger number of drivers, broken down by age groups

Adapted from [4]

## Part B: Writing the Abstract

An abstract appears at the beginning of the report. It is an abridged version of a report (typically about 150-250 words). A well-written abstract is very important as a reader uses it to judge if he or she should read the full report or paper. There are two types of abstracts: descriptive and informative.

### Descriptive abstract

A descriptive abstract describes the work abstracted and is usually short, less than 150 words. It indicates the type of information found in the report or paper and includes keywords found in it. A descriptive abstract does not usually provide results or conclusions nor does it evaluate the research [3]. Here are typical information components of the descriptive abstract:

1. Objective of the study (and method)
2. Description of major sections of report
3. Conclusion or recommendation (optional)

### Informative abstract

An informative abstract, unlike the descriptive abstract, presents the purpose, method, results, conclusions of the research and recommendations. Here are the typical information components of the informative abstract:

1. Research background
2. Research objectives
3. Research methods
4. Main results
5. Conclusion (implications & recommendations)

## Language focus

Abstracts are highly condensed versions of a report or paper. Therefore, always use concise and concrete language. Summarise all the main results and omit unnecessary details. Omit citations and references and do not direct the reader to information in the report.

### Verb forms

The verb forms used in writing sentences in the abstract are directly related to those you used in writing the related sections in your report. For example, the objective sentences in the abstract are similar to the objective sentences in the introduction. They are written in the past tense or present perfect.

## Activity 6.6
### Analysing an Abstract

Read the abstract from the article 'Analysis of all-terrain vehicle crash mechanisms' available on the main course site and answer the following questions.

1. Is the article a descriptive or informative abstract? Why?
2. Which sentences represent the information components you expect to find in the abstract?
3. Which verb forms are used for the different components?

Informative

## Summary

In this unit, you have learnt the important functions of the Conclusion and Abstract sections of a research report. You have also learnt about the structure, information components as well as the language conventions of these two sections.

## Preparing for Unit 7

The next tutorial is on presenting your FYP orally. You should (1) bring a hardcopy of your introduction written for Assignment 1 to class and (2) 4-5 PowerPoint slides you created for Assignment 2. Please read this unit before coming class as the tutorial will focus on classroom activities. There will be no class time for reading.

## References

[1] J. M. Swales, Genre Analysis: *English in Academic and Research Settings*. Cambridge, UK: Cambridge University Press, 1990.

[2] O. Kwon, C. Yoon, S. Ham, J. Park, J. Lee, D. Yoo and Y. Kim, "Characterization and Control of Nanoparticle Emission during 3D Printing," *Environmental Science & Technology*, vol. 51 no. 18, pp. 10357-10368, 2017.

[3] E. C. Leong, C. L-H. Heah, and K. K. W. Ong, *Guide to Research Projects for Engineering Students: Planning, Writing and Presenting*. Abington, U.K.: CRC Press/Taylor & Francis Group, 2015, pp. 61-65; 127-132; 135-138.

[4] G. Menon and K. L. Oh, "Distracted driving," *CEE Research Bulletin*, no. 27, pp. 58-60, 2014.

# Unit 7

## Preparing and delivering FYP reports and other technical presentations

## Introduction

This unit continues to address the challenging process of the oral presentation of technical content, and picks up on what you learnt about this in Engineering Communication I. The ability to present technical material in different situations is a valuable skill for an engineer. You will need to present in different situations, such as for the oral examination of your final year project and for professional purposes after you have graduated. Though this unit focuses on presenting your final year report, the skills that are practised are also similar to those you will need to prepare and deliver a workplace presentation.

## Learning outcomes

After completing this unit, you should be able to:

1. structure a technical presentation;
2. design effective visual aids to support a presentation;
3. deliver your presentation effectively; and
4. answer questions on your presentation effectively.

## The oral presentation process

The process of giving an oral presentation comprises the following stages:

1. structuring the presentation;
2. designing visual aids;
3. delivering your presentation; and
4. answering questions on your presentation.

For a presentation to be effective, you will need to give sufficient attention to each of these four stages.

### Structuring the presentation

The purpose of a presentation is to communicate your message to the audience. In the oral examination of your FYP, the message is your research findings. All the material you need for your presentation can be extracted from your report. You should not present any material that is not a part of your report. Your presentation should be structured to answer these four key questions:

1. Why did I do this work (emphasis is on 'this')?
2. How did I do it (what tools, approaches, techniques were used)?
3. What were my findings or results (what did you discover)?
4. What have I concluded from my work (what does it mean)?

## Activity 7.1
### Structuring a presentation

The sentences below are from the abstract of an FYP report titled Real-time colorimetric biosensor for hydration imbalance in sport activities. These sentences are not in logical order. Imagine you have to give a presentation based on the information in the abstract. You will need to re-arrange the sentences for your presentation so that the information is logically structured. (Use the four key questions mentioned above as a guide).

1. In this study, artificial sweats with different concentrations of sodium are detected using gold nanoparticles as a colorimetric biosensor to differentiate the difference between normal condition, dehydration and over-hydration conditions.
2. Available methods of measuring hydration levels are restricted, inconvenient and complicated.
3. Therefore, on-site real-time sensors to monitor hydration levels will be beneficial to individuals participating in endurance sports.
4. Although hydration imbalances such as dehydration and over-hydration are common for sport activities in many parts of the world, real-time feedback devices to monitor hydration levels are not readily available in the market.
5. The results show that the colorimetric gold nanoparticle sensor can distinguish the difference between normal hydration, dehydration and over-hydration by showing three distinct colours.
6. Gold nanoparticles are well-known for their unique optical colorimetric sensing ability and are widely studied in many fields.
7. The colour change of gold nanoparticles due to surface plasmon resonance can be observed with the naked eye.

Adapted from [1]

After you have re-ordered the sentences, check that they answered the four key questions (Why did I do this work? How did I do it? What were my findings or results? What have I concluded from my work?). Share the revised order of the sentences with your group members. Discuss whether this new structure answers all the key questions.

## Activity 7.2
### Structuring your introduction

Now read through the introduction for the FYP project that you have written in Assignment 1. Work out how you will structure it for a presentation later in the tutorial. Show the outline of your structure to your group members and invite their feedback on it.

**Designing visual aids**

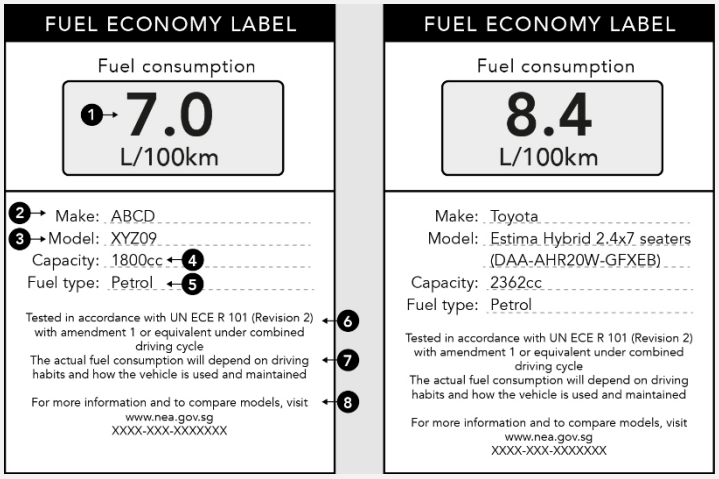
Once you have identified the key information to present, you are in a position to create your visuals. Currently, in science and engineering, projected slides are the most preferred visual aids. Keep in mind, however, that slides support your presentation; they do not take the place of the presenter. Therefore, make sure that your slides support rather than distract from your presentation. Refer to the HW0188 Engineering Communication I course guide to review principles of effective slide design.

## Activity 7.3
### Creating a visual to present key information

Work with your group members to convert research findings into an appropriate visual aid. Use the data from the Results and Discussion section below from a research project titled 'Climate change mitigation via fuel economy label (FEL)'.

First, read the abstract to get an idea of what the project is about. Then pick out some key findings to convert into a visual. (Note: you do not need to use all the data given.) Select the most effective form (charts, graphs, tables, diagrams, etc.) for presenting the data visually. Remember to include a caption for your visual.

Be prepared to project your completed visual and invite feedback from the rest of the class.




*ABSTRACT* (read for background only):

Fuel Economy Labelling (FEL) can be an effective tool in mitigating climate change arising from energy consumption and carbon emissions by cars and trucks. The purpose of this study was to evaluate the effectiveness of the Fuel Economy Labelling Scheme that was introduced in Singapore in 2012. Under this scheme, cars and Light Goods Vehicles (LGVs) that are displayed for sale are required to have the FELS label on their front windscreen to provide potential buyers with the vehicle's fuel economy information. The principal results show that 66% of survey respondents chose to buy a new vehicle based on the information given on fuel economy. However, only 32% were able to recall the information provided on the fuel labels. This indicated that the potential of the fuel label as a mitigation tool is weak and the expected effects of a fuel economy labelling are not fully realised. Hence, improving the design of the fuel economy label combined with on-going efforts to change consumers' perception is vital as the city-state evolves towards greater sustainability in road transport.

Adapted from [2]

RESULTS AND FINDINGS (to convert into a visual):

Our survey findings showed that most of the respondents cannot recall the values on the label (32%) and the specific type of fuel consumption values as urban or extra urban (39%). Information such as fuel economy and fuel consumption can be found via sources and 66% of the respondents attempted to find out the prospective vehicle's fuel economy prior to purchase. There are 12 possible sources of information (in order of importance): asked others who have similar vehicle; car dealers; manufacturer's websites; consumer reports; car magazine (e.g., *Torque*); fuel economy label on vehicles; newspapers; government web sites; environmental organisations; television ads; and radio ads. The majority relied on checking with other drivers using the particular vehicle, checking with car dealers, and checking manufacturers' websites.

Impacts of the fuel economy label need to be reinforced and enhanced as 52% did not remember seeing the fuel economy label when they purchased their vehicles, 26% remembered seeing the fuel economy label while the remaining 22% were unsure. 20% of the respondents think that the fuel economy label can be improved on.

Adapted from [2]

## Activity 7.4
### Evaluating presentation slides

Show the 4-5 slides that you have created for presenting the introduction you have written for Assignment 1 to your group members. Receive feedback on your slides from group members and evaluate slides designed by other group members.

Draw up a list of 'Do's and don'ts for PowerPoint slide design' based on comments given on slides shown by the group members. Share the group's list with the class.

**PowerPoint slide design: Do's and don'ts**

| Do's | Don'ts |
|---|---|
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |

**Delivering your presentation**

Logically structured content is crucial for a successful technical presentation. However, you also need to deliver your content confidently using the 3 V's effectively: visual (grooming; body language; eye-contact); vocal (your voice) and verbal (your words).

1. **Choice of words:** Use simple, clear words but include the correct technical vocabulary. Make sure you enunciate your words clearly and pronounce words, especially key terms, correctly.
2. **Eye-contact:** Look at the audience and avoid looking too much at the screen. Scan around the audience and not only at one part of the audience.

3. **Gestures:** Use your hands naturally as you would in normal conversation to emphasise or enhance what you are saying. Avoid common mistakes such as putting your hands in your pockets, fiddling with a pen or clasping your hands tightly. Do not walk up to the screen and point as you will block the view of the audience: use a laser pointer instead to focus the audience's attention on the features of the slide you are referring to.
4. **Posture:** Stand straight to appear confident. Distribute your weight evenly between your feet to avoid shifting from side to side. Move naturally but avoid excessive and distracting movements.
5. **Rate of speech:** Avoid speaking too fast as this will make it difficult for your audience to understand what you are saying. Speaking too fast affects the clarity of your speech. Rushing through your presentation also makes it likely that the audience will miss important information.
6. **Speaking style:** Use a spoken style, not written. You should give the impression that you are speaking to the audience, rather than reciting a written script. On the other hand, do not use colloquial speech or be too informal. You want to be taken seriously.
7. **Use verbal signposts:** Flag the importance of the points you are about to make by using verbal signposts. For example: *This is important because …*; *This was an interesting result because …*; *This was an unexpected result as …*; etc.
8. **Your voice:** If you are not using a microphone, your voice should be louder and slightly more deliberate than in normal conversation. You should sound interested in your work by using an enthusiastic tone of voice. Sound confident by avoiding verbal fillers such as *actually*, *basically*, *like*, *sort of*, *you know*, etc. or vocal fillers such as *um*, *ah*, *er*, etc. Remember to emphasise key words as this will help the audience to notice and remember important points.

The **'golden rule'** here is never to read from your PowerPoint slides word-for-word.

## Activity 7.5

### Practising delivering the background of your introduction

Effective presenters make a list of 10-20 key terms they will use in a presentation. As they say these terms, they will also enunciate them — by moving their lips, jaws and tongues in an exaggerated way — so that these terms are very clear.

Select the background paragraph(s) from your written Introduction. (1) Mark the appropriate points to pause in the paragraph with a slash (/). (2) Underline the key terms. (3) Practise delivering the background of your Introduction to your group by pausing at the points you have marked and stressing the key terms.

#### Answering questions on your presentation

Many students are nervous at the thought of answering questions from the audience at the end of a presentation because they fear not knowing the answers to the questions. The following are suggestions to help you answer questions confidently.

1. Work out beforehand the questions that you might be asked.
2. Listen attentively to the question — wait until the speaker has completed his question before answering.
3. Make sure you understand the question correctly.

4. If you do not understand the question, do not be afraid to ask for clarification.
5. Amplify the question if it cannot be heard by the audience.
6. If you do not know the answer to a question, be honest.
7. Be honest about your problems, but not negative.

## Activity 7.6
### Asking and answering questions on a presentation

Listen to your classmates' presentations. Write one or two questions you can ask each speaker after his or her presentation. If you are the speaker, answer the questions asked by your classmates.

## Activity 7.7
### Presenting online

Use the table below to discuss in your teams the similarities and differences between face-to-face and online presentations. What might be the implications for presenters when delivering online presentations?

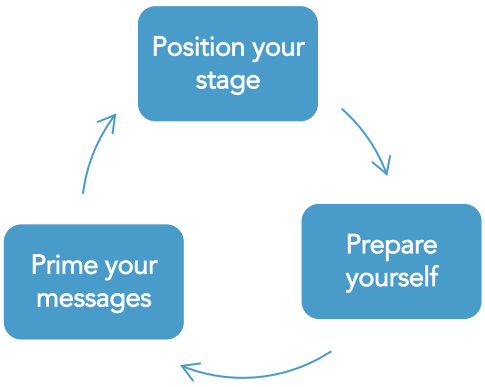
**Differences between face-to-face and online presentations**

| | Face-to-face | Online | Implications for presenters |
|---|---|---|---|
| Purpose | | | |
| Audience | | | |
| Location | | | |
| Content and organisation | | | |
| Visual aids | | | |
| Verbal and non-verbal delivery | | | |

**Presenting successfully online**

Conducting a presentation online is in many ways similar to doing so face-to-face. The general guidelines on paying attention to purpose, audience and context remain relevant and important. However, the preparation of an online delivery may require a different set of practical considerations, such as being familiar with the equipment and software application that you are using for the presentation, and the attention paid to the visual and audio impact of your online delivery. These considerations ensure that your presentation will come across as well-prepared and professional.

It is essential that your audience will view you the way you want them to do so. To achieve this aim, it will be helpful to take note of the 3 "Ps" to achieve effectiveness in online presentations: position your stage, prepare yourself and prime your messages.




The 3Ps of Presenting Online

1. **Position your stage**

**Be familiar with equipment and software**

Acquaint yourself with both the equipment and software that you'll be using for the online presentation. Online presentations often involve using videoconferencing apps, such as Zoom, MS Teams, Skype, Cisco Webex and Google Meet. Your choice of the software app will depend on the purpose of your presentation, your audience's needs, as well as the availability and accessibility of the apps.

Depending on the apps, users are able to record sessions, collaborate on projects, and share or annotate on one another's screens via various platforms. Software apps such as MS Teams and Zoom offer video, audio, and screen-sharing functions across Windows, Mac, Linux, iOS, Android, and Blackberry platforms.

Screen-sharing is useful in online presentations where you can share your presentation slides and other materials with your audience. Instructions on how to use the screen-sharing functions can be easily found on the websites of various video communication companies, with some examples given as follows:

- **Zoom:** https://support.zoom.us/hc/en-us/articles/201362153-how-do-i-share-my-screen-
- **MS Teams:** https://support.microsoft.com/en-gb/office/show-your-screen-during-a-meeting-90c84e5a-b6fe-4ed4-9687-5923d230d3a7?ui=en-us&rs=en-gb&ad=gb
- **Google Meet:** https://support.google.com/meet/answer/9308856?co=GENIE.Platform%3DAndroid&hl=en

Learn the presentation functions of the software and practice using them. For instance, in MS Teams, you can interact with your audience while presenting by using the "meeting chat" window to take questions. As the organizer, you can also mute participants to prevent them from interrupting when you are presenting. You can also be better prepared by opening all files and slides that you need for the presentation beforehand for easy access.

**Set up lighting and background**

If you are presenting from your laptop, situate a light behind the laptop to provide lighting on your face when presenting. The camera of your laptop should preferably be at your eye level when you are presenting. Use a background with minimal distractions. You can choose and apply a pre-set background for certain software. Choose a spot that is quiet. Close windows and doors to shut out distracting noise.

2. **Prepare yourself**

Dress professionally and sit up straight. If you are standing, make sure you are not too far from the microphone. If you are seated, remember that non-verbal delivery is focused on your voice, intonation, eye contact and facial expression, so check that your voice can be well-captured, and that your audience can see your eyes and face clearly. It is possible to incorporate hand gestures when necessary. To do so, it will be useful to position yourself at least one metre from the camera of your laptop.

To create eye-contact in online delivery, look into the camera when you are speaking. The audience at the receiving end of your delivery will perceive this as an eye contact, which helps to enhance engagement. This may be quite difficult to do throughout the entire presentation. However, even occasional eye-contact will help you to establish better rapport with the audience.

3. **Prime your messages**

Know your content well, and the sequence of your presentation and slides used. Each presentation should be organized according to its introduction, body and conclusion. It is essential that these are properly sign-posted for the audience to follow your speech. In online delivery, you may make use of cue cards and post-it notes to help remind you of the sequence of your slides.

Given that an online delivery may be taxing for the audience's attention span because of limited interactivity, it is essential that your presentation should be succinct and focused. Adhere to the main theme and points and avoid rambling or going off-tangent. Rehearse your delivery to keep to the time limit given for the presentation.

## Summary

In this unit, you have learnt how to present your FYP orally. You have also learnt that you will need to structure your presentation logically, design visual aids, deliver your presentation, and answer questions at the end of your presentation. You were also reminded about the 'golden rule' of making presentations, which is to never read from your PowerPoint slides word-by-word.

## Preparing for Unit 8

The next unit is the first of two units on workplace communication. Please read the unit before coming to class as the tutorial will focus on classroom activities. There will be no class time for reading.

## References

[1] Anon., "Real-time colorimetric biosensor for hydration imbalance in sport activities," Final Year Project Report, School of Materials Science & Engineering, Nanyang Technological University, Singapore, 2014.

[2] S. H. Ho, Y. D. Wong, and W-C. V. Chang, "Climate change mitigation via fuel economy label (FEL)," *CEE Research Bulletin*, no. 27, pp. 78-79, 2014.

[3] E. C. Leong, C. L-H. Heah, and K. K. W. Ong. *Guide to Research Projects for Engineering Students: Planning, Writing and Presenting*. Abingdon, U.K.: CRC Press/Taylor & Francis Group, pp. 203-218, 2015.

# Unit 8

## Written workplace communication: Writing emails

## Introduction

Emails are everywhere in our world of digital information and technology. They are useful tools of communication to disseminate data, exchange information, promote products and services, provide feedback, and solicit new customers. Emails are convenient, easy to use, offer immediacy in communication, and have become one of the most frequently used channels of business communication in the workplace. Mastering the skill of writing clear and coherent emails will help you to communicate more efficiently in the workplace. In this unit, you will learn how to write effective emails in a professional setting.

## Learning outcomes

By the end of this unit, you should be able to:

1. recognise effective email writing practices and guidelines;
2. make use of a three-stage process to plan, write and review professional emails;
3. choose an appropriate approach to plan a positive, negative, and persuasive email message; and
4. compose positive, negative, and persuasive email messages in the workplace.

## Activity 8.1
### Identifying the 'good', the 'bad' and the 'ugly' in emailing

Emails have become such an integral part of work that many people check their emails before they reach their workplace and before they retire for the day. More recently, the explosive growth of mobile technology has intensified the reliance on email as a form of communication, as we can now receive and send emails anytime, anywhere using mobile devices. Today, we tend to take emails for granted, and sometimes forget that there are good as well as bad practices when it comes to using email communication.

The misuse of emails starts when people stop asking questions about their appropriateness or practicality in relation to the communicative purpose and context. For example, it may well be less effective to communicate with a disgruntled client using email, when a telephone call or a face-to-face exchange would be more appropriate, or for colleagues sitting a few metres apart to email back and forth, when walking over and talking directly to one another will save time and energy.

Take a few minutes to ponder over the 'good', 'bad' and 'ugly' in the use of emails at the workplace. Be prepared to share your observations and experiences of these email practices with the class.

Table 8.1: Identifying the 'good', the 'bad' and the 'ugly' in emailing

| EMAIL | | |
|---|---|---|
| The 'good' | The 'bad' | The 'ugly' |
| Less urgent matters | junk | |

## The 3-stage process in email writing

Considerations of purpose, audience, and context will determine the way you organise your message and make use of language in email writing. You can make use of a 3-stage process to plan, write and review your email.

1. **Planning:** Consider the purpose in communicating, and analyse the audience so that you can construct your message to meet their needs and expectations. Gather information to fulfil the purpose of informing, persuading, motivating or collaborating.
2. **Writing:** Organise your ideas and begin writing your first draft. Select words and construct sentences to convey your intention. Pay attention to the style and tone, as well as the quality of content to meet the needs of the audience, purpose, and context.
3. **Reviewing:** Revise the draft for its organisation, content, and overall readability. Edit your message for grammar, punctuation, spelling errors, and other mechanical problems.

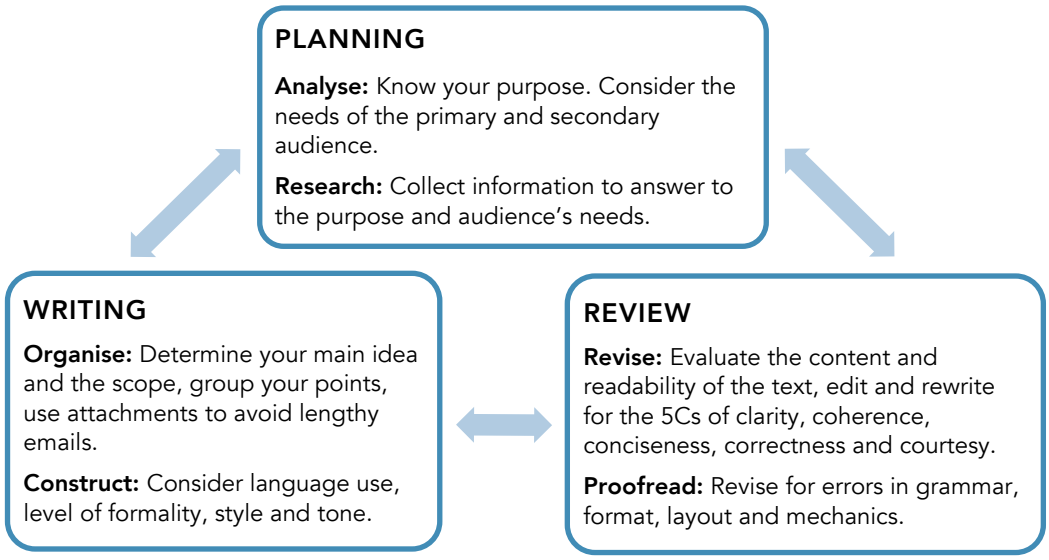



Figure 8.1: The three-stage process in writing email messages

### Planning

#### Analysing your purpose and audience

*Determine your purpose*

Most email messages have both general and specific purposes.

General purposes can form your overall strategies in writing. They include making moves to inform, to persuade or to collaborate. The general purpose determines the amount of audience participation you need and the overall control of your message. For instance, when your aim is to inform by disseminating information, you tend to have maximum control over your message, and require minimum audience participation. In contrast, in emails that aim to collaborate, you will have less control over your messages because you will have to adjust to the responses of your addressees.

Specific purposes are focused objectives set to accomplish particular tasks. They can be clear and straightforward, such as placing an order for goods, or more complex, like persuading an audience to offer support and funds. To determine the specific purpose, consider what you want the audience to think and do after reading your message.

*Know your audience*

To plan for an effective, reader-oriented email message, you need to know your audience well to serve their needs and fulfil their expectations. Your primary audience will receive the email message directly, while your secondary audience may include anyone who is indirectly involved in the communication process. It is likely that the secondary audience may be affected by your message, or they may need to approve, or hear about it. As such, they may expect to receive a carbon copy of your email message.

For all levels of audience, you should determine their level of knowledge and interest before writing to better cater to their needs and expectations. To know your audience better, ask these questions to develop an audience profile when planning your emails:

- Who are the audience?
- What are their attitudes?
- What are their professions?
- What are their cultural backgrounds?
- What do they need to know?
- Why should they care about my message and email?
- How can I address their concerns and needs?
- What is their probable response to my message?

## Activity 8.2
### Analysing purpose and audience

In the following scenarios, analyse the purpose and audience's needs when planning your emails.

Table 8.2: Analysing purpose and audience

| Scenario and context | General purpose | Specific purpose | Primary and secondary audience | Information that audience need to know |
|---|---|---|---|---|
| You want to share your knowledge on the application procedures for patents with the engineers in your Research and Development department. | Inform | Share knowledge | | |
| You and your colleagues plan to ask your chief engineer what a piece of new equipment does and how to install it. | Inquire | Instructions | Chief engineer | What the new equipment is |
| You plan to ask your university professor for a recommendation letter to apply for a job. | Persuade | Get a recommendation letter | Prof | Who the writer is and the job |

| Scenario and context | General purpose | Specific purpose | Primary and secondary audience | Information that audience need to know |
|---|---|---|---|---|
| You plan to invite a colleague to join your team to develop a new product for the company. You also want to keep your director informed of the invitation. | | | | |
| You need to share the latest hazard and operability report on your project with other design and field engineers from your head office. You also want to tap into their expertise to improve your project. | | | | |

### Writing

To ensure that your email clearly conveys what it intends to say, and to maximise your audience's acceptance of your message, it is essential to pay attention to the following elements when you are composing:

**Language and expression**: Ensure your use of language is correct and your expressions are clear, coherent, and concise.

**Organisation**: Organise your content in a clear and coherent manner, beginning with your main idea. The rest of your message should strive to support, explain, and demonstrate this point.

**Quality of content**: Research and select relevant, accurate, and useful information for your content to fulfil the purpose and your audience's needs. Check that the content provided is adequate, relevant, and accurate.

**Reader-oriented approach**: Adopt a reader-centred approach, where you consider the needs and benefits of the readers in your writing. This is often reflected in your choice of words, use of language, style, and tone.

**Style and tone**: Choose words carefully and use the appropriate tone to reflect the degree of formality, professionalism, and courtesy that is appropriate to meet the needs of the audience and purpose.

### Reviewing

Before sending your emails, always revise, edit, and proofread to evaluate the content and readability of the messages. Consider the following when reviewing:

**Formatting**: Present your email in a professional and neat layout, by providing adequate white space between paragraphs, crafting an appropriate subject title, and making use of bullet points to enhance reader-friendliness.

**Proofreading and editing**: Edit and rewrite your message or part of it to achieve the 5Cs of clarity, coherence, conciseness, correctness, and courtesy. Proofread your message by identifying and correcting errors in grammar, style and tone, and mechanics such as punctuation and spelling.

## Activity 8.3
### Identifying guidelines for writing effective emails

The following section is a list of guidelines on how to write emails effectively. Bear in mind, however, that these guidelines should be considered in relation to the purpose of the communication, the relationship between the sender and the receiver, and the regional and professional culture that one operates in.

For each guideline, write down in the description column whether you think it is a matter of *language and expression [LE], style and tone [ST], proofreading and editing [PE], organisation [O], quality of content [QC] or formatting [F].* The first one has been done for you. Note that it is possible for a guideline to have more than one description.

Table 8.3: Guidelines for writing effective emails

| Guideline | Description |
|---|---|
| 1. Business emails, like all business documents, should be objective and professional in tone. | *ST* |
| 2. Include a clear and comprehensive subject line. Change the subject line, if necessary, in an on-going email discussion to indicate to the recipients that they are getting a new message instead of a recycled one. | Organisation |
| 3. Proofread and edit every message before hitting the send button. A business message full of language errors can be offensive, and reflects negatively on the senders and their organisations. | Proofreading |
| 4. Use professional greetings (e.g., Dear Mr Chan) and sign-offs (e.g., Kind regards, Sincerely, Best wishes). You should only use more informal expressions such as 'Hi' for opening and 'Bye' for the sign-off if you have a very friendly relationship with the addressee. | LE |
| 5. Refrain from using 'emoticons' or keyboard symbol codes in business emails to convey emotions (e.g., regret, satisfaction) as this has no place in business correspondence, unless you know the recipients very well. Also, be careful of the use of capital letters for emphasis, or you may come across as aggressive and rude. | |
| 6. Pay attention to the length of your email. Bear in mind that emails are composed mainly for quick reading and prompt action, so if they are brief and concise, they have a better chance of being read thoroughly. Make use of attachments for communicating detailed information. | |

| Guideline | Description |
|---|---|
| 7. Ensure that all information which the recipient requires is included in your email. This will help reduce back and forth emailing between parties due to omitted information. Also, anticipating what the recipient needs and including such information will reflect well on you and your organisation, showing that you are proactive and audience-focused. In short, write with the audience and their needs in mind. | QC |
| 8. Highlight important information by making use of bullet points, headings and sub-headings. | |
| 9. Remember the 5 'C's of email writing; make sure your message is *clear, coherent, complete, concise,* and *courteous*. Also remember the **IBC** structure for writing – introduction, body, and conclusion. | |
| 10. Avoid using ambiguous abbreviations and acronyms, as well as using the lower case 'i' for the personal pronoun 'I' in your messages to ensure clarity in communication. | |

## Types of email messages

Most messages consist of three parts: an introduction, a body, and a conclusion (IBC). Different messages with different purposes and audiences require different approaches to organisation. One of the main aims of writing involves conveying your intended meaning as clearly as possible. By choosing the appropriate approach to organising your text, and the correct use of language and words, you will have higher chances of coming across as clear, coherent and persuasive. In addition to the 3-stage process of planning, writing, and reviewing, you should also consider the way information and content are organised to achieve your purpose of communication and to meet the needs of the audience that you are addressing.

Approaches to organising emails can be direct or indirect. The direct approach involves stating your purpose upfront in the opening, while the indirect approach often relates to the use of a buffer (a neutral statement) in the opening to preserve the dignity of your readers or simply to ease your readers into receiving the main messages, especially when they contain bad news. The choice of approaches depends on the rhetorical needs of purpose, audience, and context, as well as the types of messages.

This chapter highlights three types of common email messages that you will write or respond to at the workplace, and each comes with a recommended approach in organisation: (1) routine and positive; (2) negative; and (3) persuasive.

### Writing routine and positive messages

In the course of everyday business, you will compose many messages that share routine information and positive news. Some examples of routine messages include placing orders, making claims, requesting information and action, and requesting references and recommendations. Messages that share good news help to build good will and maintain relationships among employees within organisations, as well as with external stakeholders. Some examples of positive messages include

announcements of new establishments and facilities, appointment of new staff and introduction of new products and services.

*Organisation of positive messages*

Generally, routine and positive messages have an introduction, body and conclusion. A direct and unambiguous approach is often used because the readers are often interested in and receptive to the news that you are going to share. A direct approach comprises three stages:

1. **Introduction:** begin with the main idea;
2. **Body:** provide sufficient details and justifications; and
3. **Conclusion:** close on a positive note.

It is crucial that you make use of the 3-stage process in email writing to determine the purpose, audience, and context of the writing task before adopting the direct approach.

## Activity 8.4
### Analysing a positive message

Read and analyse the email below. Answer all the questions in the sidebar.

To: Dan Merriweather <DanMerri@gmail.com>

From: Rashid Ibrahim <RashidI@vocanos.com>

Subject: _____

Date: 16 Mar 2018

Dear Dan,

Welcome to Vocanos! Your application to Vocanos has been approved. We are proud to have you as one of our IT engineers.

Our vision at Vocanos is to be a one-stop site where business owners, investors, marketers and sales personnel can learn how to use technology and financial information effectively for their business commitments. Our posts are based on research, financial analytics, and first-hand interviews with valued industrial players, providing practical information to all movers and shakers. As a start-up blog, we aim to offer the highest quality posts to our readers. We believe that all our posts should be the best in our areas of interest.

Again, welcome onboard, Dan! The entire Vocanos team looks forward to having you in our team, and we are ready to support you in all ways to serve our readers better.

Yours very truly,

Rashid

**Introduction** Inform

What is the function of the introduction? Is the introduction effective? Why or why not?

**Body** Describe job and company

What is the function of the body?

Why is the personal pronoun "we" used?

Refers to company as a collective

Welcome new team member

**Conclusion**

What is the function of the conclusion?

**Style and tone**

What is the style and tone of the entire email? Why is such a style and tone being used?

Positive and professional tone

Discuss the use of exclamation marks and first name in a professional email.

Suggest some professional complimentary close besides "Yours very truly".

Provide a subject title for this email.

**Writing 'negative' messages**

Negative messages involve saying 'no' to your addressee. These may include saying no to a customer, an employee, a shareholder, and even to your boss. Messages that deliver bad news may be damaging and dangerous, especially if they are not accompanied by an explanation.

It is important to make use of the 3-stage process in email writing. In this case, the planning stage may involve considering if readers prefer receiving the bad news upfront, or if they prefer explanations to be provided first before hearing the bad news. The writing stage involves considering the organisation of message, and the choice of words, sentences and paragraphs to create an audience-centred tone. An addressee-centred tone helps your reader to accept that the bad news represents a firm, fair, and reasonable decision, and at the same time preserves their dignity. The revision stage needs to ensure that the message is clear, concise, and free of errors.

## Activity 8.5

### Achieving a reader-centred style and positive tone

Revise the following expressions to achieve: (1) an addressee-centred style, and (2) a positive and polite tone:

| Expressions | Revisions |
|---|---|
| 1. I totally don't understand what you have written. | |
| 2. The damage will not be fixed till next month. | |
| 3. The delay in your order is inevitable. | |
| 4. Even fools can tell that you are very unhappy about the arrangement. | |
| 5. Unfortunately, we have yet to receive it. | |
| 6. You have included a very wrong statement. | |
| 7. You are so late in your reply! | |

| Expressions | Revisions |
|---|---|
| 8. I have to refuse your request. | |
| 9. We must reject your application. | |
| 10. The misunderstanding is so regrettable. | |

**Organisation of negative messages**

Generally, negative messages have an introduction, body, and a conclusion. Both a direct and indirect approach is possible, depending on the considerations of purpose, audience, and context.

*Direct approach*

The direct approach may be used if you believe that the person you are writing to would like to know the bad news right away. It is also possible that the situation is not very serious and the news will not cause your audience much pain or disappointment. Using the direct approach, the negative message can be organised using the following sequence:

1. **Introduction**: state bad news;
2. **Body**: offer explanations/reasons; and
3. **Conclusion**: close on a positive note.

*Indirect approach*

The indirect approach is used when a terse and blunt 'no' may prevent your audience from reading or understanding your reasons. Using the indirect approach may also have the advantage of preparing the audience mentally and emotionally for the bad news by offering a buffer, in the form of a neutral and non-controversial statement. Examples of buffers are statements of appreciation or praise, or short sentences to demonstrate that you understand the reader's expectations and needs. The indirect approach involves placing a buffer upfront, with reasons and explanations following it, before giving the bad news:

1. **Introduction**: offer a buffer;
2. **Body**: provide explanations/reasons;
3. **Body**: state bad news; and
4. **Conclusion**: close on a positive note.

# Activity 8.6
## Analysing a negative message

Analyse the following email to unpack the various parts of a negative message. Explain the function of each part and evaluate its effectiveness in helping the readers to accept the message.

To: Liu Ru <liuru@Thinkbigco.com>

From: Sarwan Singh <SarawanSingh@GlobalTech.com>

Subject: _____

Date: 20 Mar 2018
Dear Mr. Liu,

Thank you for submitting your proposal to restructure our company's databases and cloud system. It was obvious that you had spent a lot of time preparing the cost estimate and the presentation. We very much appreciate the thoroughness of your plans, and the timely manner in which you have returned the cost estimate to us with the requested changes.

However, we did receive another proposal with a somewhat lower cost. After much consideration, the board decided to award the contract to this company.

Despite the outcome in this instance, we do hope you will continue to bid for other projects when future opportunities occur.

With best wishes,

Sarwan Singh

Yes, it shows that the decision made is thorough and difficult.
Thank the sender

**Introduction**

Identify the buffer.

Is a buffer necessary in this case? Why or why not?

Suggest other possible buffer alternatives.

**Body**

How is the rejection message incorporated into the text? Do you think it works in helping the reader to accept the negative news? Can you think of better ways to convey a negative message?

For longterm partnership

**Conclusion**

How is goodwill being maintained in the conclusion? Why is there a need to maintain goodwill?

**Style and tone** Polite

Describe the style and tone of this email.

Re: Proposal

What is an appropriate subject-line for this email?

Is there a need for any attachment in this email? Why or why not?

### Writing persuasive messages

Persuasive messages are written to convince the audience of the believability of your messages and motivate the audience to do something. Persuasive emails may lead your audience to change their beliefs, attitudes and actions. Some examples of persuasive emails may include sales, promotional and marketing messages, or messages related to raising funds for various causes. Benefits to the readers are often highlighted to motivate the receptiveness of messages conveyed. It is important for writers to be aware of pitfalls in representing price, quality, and performance of a product or service and stay within the law to avoid legal problems. The issue of ethics should also be considered when writing persuasive messages. Persuasive messages that have high ethical standards offer audience the freedom to make choices by providing accurate, truthful, and objective information to aid understanding.

*Organisation of persuasive messages*

The AIDA (Attention-Interest-Desire-Action) plan is often used in persuasive emails:

1. Getting attention: capture the attention of readers so as to encourage them to continue reading.
2. Building interest: provide useful information to develop and sustain readers' interest.
3. Increasing desire: highlight possible benefits for readers.
4. Motivating action: encourage readers to take action (e.g., to use a product or service).

Before adopting this strategy in organising, you have to closely analyse the needs of the audience by making use of the 3-stage process in email writing.

## Activity 8.7
### Analysing a persuasive message

Analyse the persuasive email below by answering the questions in the sidebar.

To: Amara Krishnan, MD, AK Engineering and Trading Co. <AmaraK@AKEnginCo.com>

From: Mary Wong, Director, Centre for Pediatric Cancer MWong@CPC.com

Subject: _____

Date: 22 Feb 2018
Attachment: _____

Dear Ms. Krishnan,

AK Engineering and Trading Company has been a loyal supporter of our Centre for many years, and your generous donations have made a huge difference in the lives of children who have been stricken with cancer. Because of your generosity, many of them are able to receive treatment and to regain their health.

With the progress of cancer research, there is an exciting opportunity now to introduce a newly tested and proven treatment to save even more of these young lives. For this treatment to be installed and administered by the end of this year, we hope that you might consider donating $20,000.

As a donor, we know you will find great satisfaction in helping and saving numerous young lives. To show our appreciation, we are planning to name the new treatment rooms after our corporate friends who will be funding us in this project.

Thank you once again for all that you have done for us in the past, and we appreciate your consideration of this new request. Please mark your pledge card and email it back to us, and we will then contact you within two working days.

Thank you very much for your continued encouragement and support.

**Introduction**
How does the opening capture attention?

**Body**
How did the writer create interest in the new treatment?

Are you persuaded by the body of the email? Why or why not?

What information can be included to create more interest on the subject?

**Conclusion**
How did the writer create a desire to donate in the conclusion?
How does the writer motivate action?

Yours sincerely,

Mary Wong

**Style and tone**

Describe the style and tone used. Suggest 1) a suitable subject title for this email, 2) a possible attachment, and 3) how the attachment can be incorporated.

## Activity 8.8
### Writing a positive or negative response

This activity requires you to work as a team to respond to the above email. Choose any one of the following cases to write a reply to Mary Wong. You may work on all the cases if time permits.

Make use of the knowledge and skills that you have learnt on email writing to compose your message. Be aware to use only relevant information for your content. Share your completed email message with the rest of the class and comment on one another's work using the Assignment 3 self-evaluation checklist.

**Case 1: Writing a negative message**

You are Amara Krishnan, Managing Director of AK Engineering and Trading Company. You have received the above mail from Mary Wong, Director of the Centre of Paediatric Cancer requesting donations for a new treatment for their patients. At present, your company does not have the financial resources to make extra donations to charitable organisations. Rising overheads and a lack-lustre economy have resulted in a tight cash flow, and you are unable to provide the money requested. Because yours is a small company, you are extremely tight on resources. It appears to you that your company can only provide through its outreach program monthly donations of $200, which is part of what you have been doing so far for the Centre. This has been the case for the last 3 years.

In about 150 words, write an email to Mary Wong to turn down her request for a donation.

**Case 2: Writing a positive message**

You are Amara Krishnan, Managing Director of AK Engineering and Trading Company. You have received the above mail from Mary Wong, Director of the Centre of Paediatric Cancer requesting donations for a new treatment for their patients.

Write an email of about 100 words to Mary Wong to share with her your company's commitment to providing continual financial support to the Centre, including agreeing to her request for $20,000. Include in your email the way you want the treatment room to be named.

**Case 3: Writing a persuasive message**

You are Amara Krishnan, Managing Director of AK Engineering and Trading Company. You have received the above mail from Mary Wong, Director of the Centre of Paediatric Cancer requesting donations for a new treatment for their patients.

Forward the email from Mary Wong to your business associate John Ray. John is the Director of a newly established SME manufacturing bio-medical supplies company which is looking for opportunities to contribute to the local community. Share with him the information on the new treatment and the request from the Centre of Paediatric Cancer. Persuade him to join your company in sharing the donation to the Centre. You email should not be longer than 180 words.

## Activity 8.9
### Discussing Assignment 3

Read the guidelines for Assignment 3. Be sure you are clear about them, and raise any questions you may have with your tutor.

## Summary

In this unit, you have learnt the fundamentals of writing effective emails using the three-stage process of planning, writing, and reviewing. You have also learnt to consider purpose, audience and context in crafting your message, as well as make use of language, style, and tone to communicate effectively.

## Preparing for Unit 9

The next tutorial is on oral communication in the workplace. Please read the unit before coming to class as the tutorial will focus on classroom activities. There will be no class time for reading.

# Unit 9

## Spoken workplace communication

## Introduction

In effective spoken communication, the sender constructs and delivers messages to meet the audience's needs and fulfil the purpose of the communication task. Effective speaking involves planning what to say, and monitoring how to say it in a clear, concise, and coherent manner.

This unit focuses on two common spoken communication tasks in the engineering workplace: discussions at meetings and interactions with clients (see Figure 9.1). Specific communication skills that support these tasks, such as conversation and listening skills, are also discussed. Mastering these skills will enable you to communicate more effectively in the workplace.


Figure 9.1: Common workplace communication tasks NTU engineering graduates perform according to an employers' survey in 2014

## Learning outcomes

By the end of this unit, you should be able to:

1. understand the basic responsibilities of a chairperson and participants in a meeting;
2. prepare for meetings and participate effectively in discussions;
3. understand the role of conversations in interactions with clients;
4. identify the key features of effective conversations;
5. make use of small talk in business conversations; and
6. apply active listening skills in oral communication tasks.

## Meeting discussions

Meetings make up a big part of working life in any profession, so you are likely to find yourself attending different types of meetings once you join the workforce. These can be external meetings, project or committee meetings, and departmental or inter-departmental meetings, among others. Meetings are organised for different purposes, including updating information, brainstorming, solving problems or resolving conflicts.

Before the meeting is called, the organiser or chairperson must decide on key matters such as the meeting objectives, items for discussion, venue, time and duration of meeting, right down to time allocated to each item for discussion. Such information would usually be disseminated, in advance, to the meeting participants in the form of a meeting agenda. During the meeting, the secretary, or any person appointed, will take notes or minutes, which will be circulated to everyone after the meeting. Figure 9.2 shows the key responsibilities of chairpersons of meetings.


Figure 9.2: Responsibilities of chairpersons of meetings

## Activity 9.1
### Identifying the responsibilities of participants at a meeting

Participants in meetings have responsibilities and roles to play in making meetings successful. Brainstorm in your group the roles and responsibilities of participants, and write 3-4 of them in the space below. Share your answers with the class.

1. Be well-prepared.
2.
3.
4.
5.

Compare your list with other group members. Which are the common responsibilities identified?

# Activity 9.2
## Practising meeting discussion skills

**Scenario:**

You are the executive member of the 'Reach-out' committee in your company Toogle Tech, a Fortune 500 company. As part of Toogle Tech's focus on corporate social responsibilities, your committee organises meaningful programmes to help charitable organisations all over the world.

Your committee plans to invite an inspiring celebrity to give a 30-minute talk on the topic 'Making the world a better place' to your company staff during your monthly luncheon interaction. After several brainstorming sessions, the committee has narrowed the choices to the following three potential speakers*:

**Web resource: Scientist and Singapore youth award winner Dr Yeo Sze Ling [1]**

http://www.straitstimes.com/singapore/a-beautiful-mind

**Web resource: Olympic Gold medallist Mr. Joseph Schooling [2]**

http://www.straitstimes.com/singapore/pain-behind-the-glory

**Web resource: Businessman and philanthropist Mr. Chua Thian Poh [3]**

http://www.straitstimes.com/singapore/chinese-community-leader-chua-thian-poh-tops-list-of-national-day-award-winners

***Scan the QR codes to learn more about the potential speakers**

### Part 1: Preparation for meeting

You have received the following agenda from the 'Reach-out' committee secretary for a coming meeting:

**Agenda for Meeting**

Date: 1 Oct 20XX (Wed)
Time: 1015-1115am
Venue: Conference Room 1

Aim of meeting: to finalise choice for speaker in Luncheon Interaction Talk

Items to be discussed:

1. Luncheon Interaction Talk speaker choice
2. Invitation letter/Email to chosen speaker
3. Any other matters

Spend a few minutes studying the objective of the meeting and the agenda items. Prepare for the meeting by writing down your input to help resolve issues/problems that may be tabled at the meeting. Be prepared to share the intent and reasoning of your input.

| Items to be resolved | My input (may include opinions, comments, suggestions, questions, solutions, decisions, or any other relevant and useful information) |
|---|---|
| | |

**Part 2: Participation in meeting discussion**

Using the notes that you have prepared, conduct a mock meeting discussion in your team of 4-5. You will showcase your ability to lead and participate in the discussion, making use of your speaking and listening skills. Each of you will contribute your ideas and steer the meeting to solve any problem, and arrive at a decision at the end of the 10-minute discussion. One member will summarise the main points before the meeting ends.

**Part 3: Self-reflection on meeting discussion**

Reflect on the way you and your team have participated in the mock meeting. Answer the following questions to learn from your experience. Be prepared to share your reflections with your team and the class:

| Role as leader and participant | |
|---|---|
| 1. Were you task-oriented? Did you adhere to the agenda? Did you initiate ideas and offer suggestions? | |
| 2. Did you help to facilitate and lead the discussion in any way? Did you help the team to move forward in the discussion? How did you do that? | |
| **Behaviour during the discussion** | |
| 3. Did you talk too much or too little? | |
| 4. How did you assert your views to persuade? | |
| 5. How did you and your team handle disagreements? How did you come to a consensus? | |
| **Speaking and listening** | |
| 6. Did you speak clearly and coherently so that everyone understood your message? | |

| | |
|---|---|
| 7. Did you use non-verbal signals (e.g., tone of voice, head nods, eye contact, and gestures) appropriately to support what you said and to show that you were listening? | |
| 8. Were you an active listener? Did you listen to the other participants' views, suggestions, and questions carefully before responding? Did you clarify doubts and provide feedback? | |
| **Time management** | |
| 9. Were you time-conscious? Did you waste anyone's time by digressing and not adhering to the agenda? | |
| 10. Did your team start and end the meeting on time? | |

Write down three things that you have learnt about discussions at meetings.

## Interactions with clients

The aim of interaction with clients is to exchange information, negotiate propositions, and arrive at mutually desired outcomes in business work plans and transactions. Interactions with clients in oral communication may take place via channels such as face-to-face meetings, videoconferencing, and phone calls.

To interact effectively with clients in oral communication, you need both speaking and listening skills, as well as good conversational skills. Successful oral communication hinges on the clarity in speech and thought, as well as active and effective listening.

### Active listening

Listening to another person is more than giving eye contact and nodding our heads now and then to give the impression that we are attentive. In fact, all of us would have experienced the frustration of not being listened to, and are ourselves guilty of not listening at times. As Ashleigh Brilliant puts it, "If you think communication is all talk, you haven't been listening." [4]

In the section, we will explore the nature of active listening, and think of some ways to help us become better listeners.

## Activity 9.3
### Identifying the significance of active listening

**Video activity [5]**

Here is a video clip about the receptive aspect of conversation.

(https://www.youtube.com/watch?v=p1jzdSzGHnA)

**Discussion:**

1. What happened to the communication process? What led to its breakdown?
2. What is the difference between hearing and listening?
3. What factors cause people to be inadequate at listening?

## Activity 9.4
### Identifying strategies of active listening

In your team, think of 3-4 strategies that can help to improve listening skills. Write down your ideas in the space below.

| |
|---|
| 1. Focus on the message content |
| 2. |
| 3. |
| 4. |
| 5. |

## Business conversations

Business conversations often follow a 4-phase pattern of: (1) opening and greeting, (2) building rapport prior to business discussion, (3) discussing business matters, and (4) showing goodwill and closing. In the rapport-building phase, topics of interest which are non-business related are often raised to create a friendly atmosphere for the business discussions that follow. This may involve 'small talk', or forms of light, informal and upbeat social exchange before participants engage in serious business discussions.

Effective small talk prior to business discussions helps to put people at ease, build goodwill and prompt people to open up to one another, especially those meeting for the first time. Making small talk can be useful in building positive relationships with your clients.

However, you should be aware that small talk or any form of conversation other than business-related ones may be seen as frivolous and time-wasting in certain business contexts and with certain audiences. You have to be aware of the purpose and context of communication, as well as your audience's profile before making use of any form of small talk or informal conversation appropriately to build rapport.

## Activity 9.5
### Choosing topics for small talk to build rapport

Topics for 'small talk' may vary according to context, but in general, skilful conversationalists choose topics centred on common knowledge, and avoid topics that may intrude on people's privacy or stir up strong emotions. After all, the purpose of small talk is to build bridges, not turn people away.

Here are some conversational topics.

| | | |
|---|---|---|
| **Politics** | **Arts & Entertainment** | **Sports** |
| **Personal Finances** | **Hobbies** | **Age & Appearance** |
| **Food** | **Family** | **News & Current Affairs** |
| **Weather** | **Celebrity lifestyle** | **Religion** |
| **Travel** | | |
| **Newest gadgets** | **Fashion** | **Office gossip** |

In pairs, circle the topics that are appropriate for small talk and justify your choices. Suggest other possible topics.

## Activity 9.6
### Practising small talk in client interactions

**Scenario:**

Your company Toogle Tech has invited Mr. Chua Thian Poh to give a talk during your monthly luncheon interaction. As an executive member of the committee that organises the talk, you play a role in helping your Director to receive and host your guest throughout the event.

**Part 1: Selecting and developing small talk topics**

Brainstorm in your group what small talk topics are possible for such an interaction.

Provide an example of what you will say for each topic suggested:

| Small talk topics | Examples of statements, comments, questions to be asked |
|---|---|
| | |
| | |
| | |
| | |

**Part 2: Role-playing**

In pairs, role-play how the small talk interaction may unfold. Practice initiating topics for small talk and making use of active listening skills to help you to respond appropriately to the speaker's utterances. Be prepared to share your role-playing with the class.

**Part 3: Reflections**

1. What were the challenges you faced while making small talk?
2. What were some good practices or strategies that you observed?

## Qualities of an effective conversationalist

Table 9.1 shows key qualities of effective conversationalists and a description for each quality. For each description, think of a suitable word which summarises the trait and write the word in the space provided. To help you, the first letter of each word is given.

Table 9.1: Qualities of effective conversationalists

T_____ clearly

Good conversationalists are able to mentally organise their ideas in a logical fashion. Engineers, in particular, are trained and expected to communicate coherently, in a structured way. Some common thought structures adopted by well-organised speakers are as follows:

| PPF | BPR | IBC | BPA |
|---|---|---|---|
| Past (P) - What has happened | B – Background | I – Introduction | B – Background |
| Present (P) - What is happening | P - Problem | B - Body | P – Position |
| Future (F) - What will happen | R- Recommendation | C – Conclusion | A - Argument |

By organising their thoughts logically, good conversationalists help their listeners to understand the spoken message well and retain the main ideas.

S_____ sensibly
Good conversationalists know that words can 'make' or 'break' another person. They are cautious about the words they use, and avoid words that may be offensive, racist or sexist. In professional communication, they are discreet with the use of technical jargon. Before a non-technical audience, they try to minimise the use of technical jargon and rely on regular terms and descriptions to enhance the audience's understanding.

L_____ actively
It has been said that the highest compliment one can pay another person is to let the other person know that he or she has been heard. By this, it means the listener is able to show the speaker that the spoken message has been understood. In business settings, the information received will help the astute listener to understand clients' requests and expectations, and, possibly, anticipate new needs.

O_____ closely
Good conversationalists watch carefully how their counterparts respond to them, and modify their own behaviours or conversation topics to make sure that the other party is comfortable. While not all of us are body language experts (or need to be), we tend to be able to sense it when others are uneasy about how a conversation is going by their facial expressions or other non-verbal cues. Loss of eye contact, excessive fidgeting or yawning could imply a loss of interest. If unsure, good conversationalists will verify, and adjust their own behaviours, if necessary, to keep their counterparts engaged.

B_____ enthusiastically
Non-verbal communication constitutes a big part of human interaction. In face to face interactions, particularly at business meetings, the way we are attired, how we say something and our body language convey indirect messages to our counterparts about how we view the relationship and the topic of discussion. Occasional smiling, nodding of the head, casual eye contact or a firm handshake help convey enthusiasm at face to face interactions. Good conversationalists project enthusiasm and make their counterparts feel valued and respected.
J_____ cautiously
As humans, we make judgments of people all the time. We assess others based on their appearances, and their verbal and non-verbal language. We ourselves are being assessed by others continually, so we try to conduct ourselves to the best of our ability, hoping to be judged favourably. Good conversationalists, on the other hand, are careful to avoid the pitfalls of human perception. They avoid jumping to conclusions based on the external appearances of others, or the words that others use, given the awareness that words can have multiple meanings that change according to context. This prevents good conversationalists from making premature, and sometimes, regretful judgments, especially in business interactions.

R_____ broadly
Good conversationalists are not experts in everything, but they keep themselves informed about trends and key events in the world. In this way, they are able to contribute ideas and share their opinions whenever these topics are raised.

In addition, a good sense of humour is always helpful in keeping the conversation relaxed and affable. However, it is important not to try too hard to be funny, or worse, use humour to single out or belittle others. If humour is not appropriate or you are uncertain about using it, avoid it, but stay engaged and involved throughout the conversation, and you will still come across as genuine and professional.

## Your professional image

The way you communicate at the workplace reflects your values, beliefs, work ethics, knowledge and level of expertise. After a while, people may come to associate you with certain values and ideals, and even make predictions of your responses and behaviours based on their observations and interpretations of the way you communicate and interact with the people around you. Effective communication skills may play a role in helping you to shape your professional image and identity in a positive way.

## Activity 9.7

### Constructing your professional image via effective oral workplace communication

Read the following extract of an interview with Professor Laura Morgan Roberts from Harvard Business School [6].

| | |
|---|---|
| Interviewer: | What is a professional image? |
| Roberts: | Your professional image is the set of qualities and characteristics that represent perceptions of your competence and character as judged by your key constituents (i.e., clients, superiors, subordinates, colleagues). |
| Interviewer: | How do authenticity and credibility influence the positive outcomes of impression management attempts? |
| Roberts: | … When you present yourself in a manner that is both true to self and valued and believed by others, impression management can yield a host of favourable outcomes for you, your team and your organisation. On the other hand, when you present yourself in an inauthentic and non-credible manner, you are likely to undermine your health, relationships, and performance. |

In groups, discuss the following questions and be prepared to share your answers with the class:

1. What do you think are the characteristics of professionalism?
2. In what ways do you think effective oral workplace communication may help to construct a positive professional image at the workplace? Suggest examples to illustrate and explain.

## Summary

In this unit, you have learnt how to communicate effectively during discussions at meetings and interactions with clients. You have also learnt how to use small talk and active listening skills to engage in basic business conversation.

## Preparing for the next lesson

The next lesson is an online tutorial on intercultural workplace communication. Please access the tutorial in your NTULearn tutorial site and answer all the quiz questions.

## References

[1] K. Toh. (2017). "A beautiful mind," *The Straits Times*. [Online]. Available: http://www.straitstimes.com/singapore/a-beautiful-mind.

[2] C. Yee. (2017). "Joseph Schooling: Pain behind the glory," *The Straits Times* [Online]. Available: http://www.straitstimes.com/singapore/pain-behind-the-glory.

[3] W. Leong. (2017). "Chinese community leader Chua Thian Poh tops list of National Day Award winners," *The Straits Times* [Online]. Available: http://www.straitstimes. com/singapore/chinese-community-leader-chua-thian-poh-tops-list-of-national-day-award-winners.

[4] A. Brilliant. (2016). "Ashley Brilliant Quote," *AZ Quotes* [Online]. Available: http://www.azquotes.com/quote/788153. [Accessed May 20, 2016].

[5] N. del Toro. "The Big Bang Theory – Please pass the butter!!" *YouTube*, Apr. 4, 2014 [Video file]. Available: https://www.youtube.com/watch?v=p1jzdSzGHnA. [Accessed: May 30, 2018].

[6] M. Stark. (2017). "Creating a Positive Professional Image," *HBS Working Knowledge* [Online]. Available: http://hbswk.hbs.edu/item/creating-a-positive-professional-ima ge.

Week 12 and 13 tutorials

# In-class presentations

(Assignment 2: Oral Presentation of an FYP Introduction)

Tutorials for Weeks 12 and 13 have been set aside for you to deliver your presentation for Assignment 2: Oral presentation of an FYP Introduction. Your tutor would have informed you by Week 11 whether you are presenting in Week 12 or 13. Make a note of the week you are presenting. To prepare for your presentation, please read the guidelines for Assignment 2 carefully.

On the day of your presentation, each presenter should download a copy of the HW0288 Technical Presentation Feedback Form from the main HW0288 NTULearn course site. Print the form, fill in the required information and pass the form to your tutor at the start of the lesson.

**Note**: In the second part of the tutorial in Week 13, the course will be reviewed.

# HW0288

## Engineering Communication

## Course assignments

# General instructions

HW0288 Engineering Communication is a non-examinable course. Your performance will be assessed through 3 assignments and class participation. The breakdown of the course assignments is presented in the table below:

| Assignment | Word limit/Duration | Type | Weighting |
|---|---|---|---|
| **Assignment 1:** Writing an introduction | **500 words** | Individual | **30%** |
| **Assignment 2:** Oral presentation of an introduction | **5 minutes** | Individual | **30%** |
| **Assignment 3:** Writing emails | **300 words** | Paired | **25%** |
| Class participation | **Weeks 2 - 13** | Individual | **15%** |
| **Total** | | | **100%** |

Please read the following instructions carefully:

1. Submit a **soft copy** of your written assignments (Assignments 1 & 3) through the **Turnitin** link in your tutorial sites AND a **hard copy** of the assignments to your tutor.
2. Type your assignments in Times New Roman, font size 12, and use double-space.
3. Attach the Declaration of Academic Integrity form (available on the main course site) to your assignments before submission.
4. Upload a **soft copy** of your Assignment 2 presentation slides to your NTULearn tutorial site.
5. Please take note that the following penalty will be imposed for late submission of assignments:
    - Marks will drop by 10% for each day that an assignment is submitted late. If the assignment is not received by the tutor after the 5$^{th}$ day (including weekends and public holidays), it will not be accepted for grading unless there is a valid reason.
    - The submission date/time of the assignment is based on the date/time the hard copy is received by the tutor, **or** the date/time the soft copy is successfully submitted through **Turnitin**, whichever is earlier.
6. Read the guidelines on academic dishonesty found at http://bit.ly/1PMaL42 and the penalties for academic dishonesty below before submitting your assignment:
    - A student who is suspected of academic dishonesty will be requested to attend an interview conducted by the coordinator of the course and his/her tutor. If the student refuses to attend the interview, his/her assignment will receive a 'fail' grade.
    - If it has been established that the extent of the dishonesty is serious (i.e., a plagiarism score* of between 30% and 50%), the student's grade for that assignment will be lowered by a letter grade.
    - In especially serious cases (i.e., a plagiarism score* equal to or higher than 50%), the assignment will receive a 'fail' grade.

* *Note*: The plagiarism score here is an adjusted one, as not all items identified by the anti-plagiarism software may be true instances of plagiarism. They could be due to poor referencing style.

The assignment instructions are provided in the following pages according to the order of the assignments.

# Declaration of Academic Integrity

HW0288 Engineering Communication

**Assignment title:**

**Student's (official) name:**

**Student's (official) name:**

**Tutorial group number:**

**Tutorial day/time:**

**Tutor's name:**

---

### Declaration

I/we have read and understood the guidelines on academic integrity found at http://bit.ly/1PMaL42 and the penalties for academic dishonesty (as stated in General instructions), and declare that this assignment is my own work and does not involve plagiarism or collusion according to the University's honour code and pledge. Sources which I have included in my work have been appropriately referenced. I have also not submitted any part of this assignment for another course.

**Student's signature:** **Date:**

**Student's signature:**

---

**Note**: The assignment will not be marked unless this form is completed and signed. Penalties will be imposed for late submission and plagiarism. Please refer to the General Instructions for details.

# Assignment 1

## Writing the introduction

### Overview

| | |
|---|---|
| **Type:** | Individual |
| **Word limit:** | 500 words |
| **Weighting:** | 30% |
| **Deadline:** | Week 7 tutorial |
| **Objectives:** | • To practise writing the introduction of an FYP report<br>• To review skills learnt in Unit 2 and 3 |

### Instructions

#### Task

Write the Introduction for a possible FYP report in your discipline. It should include the key components in such an introduction and should not exceed 500 words.

#### Content and structure of your Introduction assignment

The content of your Introduction should not exceed 500 words and should include the following:

- An informative and concise title (not exceeding 12 words)
- Key components of an introduction
- 3-5 references from papers/reports related to your research topic
- The flow of information to reflect the typical organisational pattern in an Introduction
- A final reference list

**Note:**

1. The **word count includes headings** and **titles of tables/figures**, but **excludes the reference list** and the title.
2. Please refer to Unit 2 on writing the introduction for an FYP for guidance on writing the Introduction and to Unit 3 for guidance on reviewing and citing literature.

### Submission

In the tutorial in Week 7, submit a **hard copy** of your Introduction to your tutor and a **soft copy** to **Turnitin** on your **NTULearn tutorial site**.

You must pay meticulous attention to referencing conventions in your submission. You can use either the APA or the IEEE referencing style. Remember to acknowledge the sources of your information. Extensive 'borrowing' of ideas without proper referencing is called PLAGIARISM. Plagiarism is a serious offence and can result in a 'fail' grade. Wholesale copying from any source is a VERY SERIOUS FORM OF PLAGIARISM.

Your Introduction should be typewritten in **Times New Roman, font size 12**, and **double-spaced**. Please fill in the plagiarism declaration form and include it in your submission.

# Assignment 1: Writing the Introduction of an FYP report

Checklist

| Components | Check ✔ |
|---|---|
| **Title**<br>• Informative<br>• Not too general or too specific<br>• Concise | |
| **Content & organisation** | |
| 1. **Background**<br>• Introduces topic area<br>• Narrows down to specific issues<br>• Reviews relevant literature related to the topic | |
| 2. **Research gap**<br>• Defines the problem and the need for further research | |
| 3. **Objective of the study**<br>• Describes the objectives of the research project | |
| 4. **Scope**<br>• Outlines the parameters of the project | |
| **Language and style** | |
| • Good overall structure<br>• Well-connected paragraphs<br>• Smooth flow of sentences<br>• Appropriate use of transitional devices<br>• Employs good grammar, punctuation, and correct spelling | |
| **Referencing** | |
| **In-text citations**<br>• Correct and consistent style<br>• Adequate and appropriate use<br>• Acknowledged properly<br>• Included in the reference list | |
| **Reference list**<br>• Correct and consistent style | |

# Assignment 2

## Oral presentation of an introduction

### Overview

**Type:** Individual

**Weighting:** 30%

**Deadline:** Week 12 and 13

**Objectives:**

- To practise giving a technical presentation with reference to an FYP
- To review skills learnt in Unit 2, 3 and 7

## Instructions

### Task

You will give a 5-minute oral presentation of the introduction to the FYP report you wrote for Assignment 1. Create 5-6 slides to support your presentation.

Each presentation will be followed by a short question and answer session. Presenters should be ready to answer questions raised by the audience.

### Submission of slides

Upload your slides at least one day before your presentation on your NTULearn tutorial site.

## Preparation for presentation

You are advised to test the equipment in the room where you will be presenting to make sure that your visuals work as planned. If you prefer, you may use your own laptop.

During the presentation weeks, please **be punctual for class**. Your presentation should be **consistent and cohesive in terms of content, organisation and visual display**.

Do **dress appropriately** for your presentation. Also, you should bring along a copy of the presentation feedback form available on the main course site to give to your tutor at the beginning of the class. The form should be filled in where applicable before it is handed in.

# HW0288 Oral presentation feedback form

| Name: | | Tutorial group: | |
|---|---|---|---|
| Title: | | | |

| Criteria | Comments |
|---|---|
| **Content & organisation** | |
| • Includes **an appropriate opening**: Gets attention, introduces topic, previews presentation<br>• Provides relevant and well-organised background information with adequate support/evidence; moves from general to specific material<br>• Establishes the relevance of the research; identifies a research gap or avenue for research<br>• Clearly states the objective of the research project<br>• Identifies the scope of the research, providing reasons for including or excluding factors or samples<br>• Provides an **effective closing**: Emphasises the objective, **significance** of the research | |
| **Delivery** | |
| • Uses **language** effectively: transition words and verbal signposts, grammatical accuracy, accurate and confident expression, fluency<br>• Uses **voice** effectively: volume, articulation, pace, use of pauses, varied intonation, word stress<br>• Uses appropriate **body language**: posture, position, movement, facial expressions, eye contact, gestures<br>• Establishes **rapport** with audience<br>• Uses **equipment** confidently<br>• Adheres to **time limit** | |
| **Visual aids** | |
| • Chooses an appropriate **slide design**: background, colours, fonts<br>• Uses **text** effectively: quantity, parallel phrases, font size, formatting<br>• Uses clear **visuals**: professional, accessible, relevant<br>• Ensures a neat **layout**; uses animation appropriately<br>• Has an appropriate **number of slides**; includes title, agenda, and conclusion slides | |

## Q & A

- Answers questions confidently and knowledgeably
- Asks other speakers appropriate questions about their presentations

**Overall comments** *(if any)*

# Assignment 3

## Writing emails

### Overview

| | |
|---|---|
| Type: | Paired assignment |
| Word limit: | 300 words |
| **Weighting:** | 25% |
| **Objectives:** | • To apply the 3-stage process of writing emails<br>• To compose a positive/negative/persuasive email message |

## Instructions

### Task

A case scenario will be provided at the main tutorial site on **NTULearn**. Read and analyse the given case thoroughly before applying the 3-stage process in planning, writing and reviewing to answer the task. Make use of the knowledge and skills learnt in Unit 8 on writing emails to respond to the given task.

Your email message should demonstrate your ability to:

1. interpret the task thoroughly;
2. organise the message appropriately to meet the needs of purpose, audience and context;
3. write clearly, coherently and concisely;
4. use language and mechanics correctly; and
5. use a professional, positive and polite tone.

You are encouraged to refer to the **Assignment 3 Self-Evaluation Checklist** to review your email message.

### The format and word count

You may make use of the following format in your email composition:

To:
From:
Cc:
Date:
Subject:
Attachment:

Salutation

[Message content]

Complimentary close

**The 300-word-limit includes only the subject title and the message content.** The rest of the formatting (e.g., To, From, Cc, Attachment, Date), salutation (e.g., *Dear XX*), and complimentary close (e.g., *Yours sincerely*) are excluded from the word count.

### Other points to note

The attachment function may be considered for some case scenarios to signal additional information to be included. However, no write-up of any attachment is required of this assignment. As such, no separate write-up on attachment will be considered for grading.

## Submission

In **Week 13**, submit a **hard copy of Assignment 3 to your tutor**. A **soft copy** of your assignment should also be submitted through **Turnitin** on your **NTULearn tutorial site**. Only one member needs to submit the soft and hard copies of the assignment.

Your report should be type-written in **Times New Roman**, font **size 12**, and **double-spaced**. The hard copy should be submitted together with the assignment cover page.

# Assignment 3: Writing emails

Checklist

| Components of assignment | Yes/No/Comment |
|---|---|
| **Organisation**<br>**Overall**<br>• Is the choice of approach (e.g., direct, indirect) appropriate in meeting the needs of purpose, audience and context?<br>• Is there an introduction, body and conclusion? | |
| **Positive message**<br>• Is the purpose stated upfront in the introduction?<br>• Are supporting details provided in the body?<br>• Is there a cordial close in the conclusion? | |
| **Negative message**<br>• Is a buffer used in the introduction?<br>• Are explanations for bad news given in the body?<br>• Are there sufficient supporting details in the body?<br>• Is there any suggestion to help the reader?<br>• Is there a cordial close in the conclusion?<br>• Is the organisation of message in breaking negative news justified? | |
| **Persuasive message**<br>• Is the AIDA approach used?<br>• Is the attempt to get attention effective in the introduction?<br>• Are the supporting details in the body to create interest effective?<br>• Are there sufficient attempts to build desire?<br>• Is there a push for action in the conclusion? | |
| **Content**<br>• Is the content relevant to the required task?<br>• Is the purpose of the message clear?<br>• Are the supporting details useful and relevant in supporting the purpose?<br>• Does the content answer to the task given?<br>• Will the message content achieve its purpose? Why?<br>• Does the subject title clearly express the message content?<br>• Does the subject title capture attention as required for persuasive messages? | |
| **Language and mechanics**<br>• Are the sentences and paragraphs clearly constructed?<br>• Are the ideas in sentences and paragraphs coherently expressed?<br>• Is there a correct use of grammar, spelling, and punctuation? | |
| **Style and tone**<br>• Is the choice of words appropriate to purpose and audience considerations?<br>• Is the tone of message reader-centred?<br>• Does the message sound professional and polite? | |

# Class participation

Your class participation will be assessed according to the following criteria, with (1) being poor and (5) being excellent:

1. No participation
2. Infrequent/inconsistent participation
3. Occasional participation (answers questions when asked)
4. Voluntary and regular participation
5. Always voluntary, frequent and very insightful participation – shows understanding of the subject.