UNIT 5: WRITING A TECHNICAL REPORT

Aim: to help engineering students develop the skills needed to **write good technical reports**

Technical reports are the **most frequently** type of document written in **engineering**. They are written with the same objective, which is to document scientific or engineering results and communicate their significance to the readers. However, at university, your reports will be read by teachers and lecturers in order to assess your mastery of the subject, while in the workplace, they may be read by fellow engineers, managers, clients, etc. The ability to write clear, precise and professionally looking reports is a skill that will thus stand you in good stead, both here at university and in your future career.

1. Structure of a Technical Report

Although types of reports can vary greatly, the basic structure of reports is similar:

1. **Title Page**: this gives readers the title of the report and information such as the course code, department, university
2. **Abstract**: in the abstract you briefly explain what the problem was, how it was investigated, what your findings were and how they should be interpreted.
3. **Introduction**: the Introduction states the aim of the project, sets the scene and describes the field of research. It also provides an overview of the problem, identifies the main processes that you will be focusing on and reviews relevant research.
4. **Method**: the method gives an analysis of the problem, and then explains the materials and the scientific procedures used. Whenever possible, the analysis must be supported by facts and figures.
5. **Results**: this section reports the main findings of your research
6. **Discussion: this section** critically evaluates the findings, describing the patterns and principles that they show, and explaining how your results relate to expectations and the literature cited in your Introduction. Observations must be supported by relevant data only, stated in terms of the level of agreement or disagreement with the experiment conducted.
7. **Conclusion**: this section briefly sums up the main points from the science
8. **References**: this section lists the sources that you have used to write the report

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1.1 Formulating a (Working) Title

As it forms the basis for the majority of online computer searches nowadays, the title of a report is essential. Although it is often a last minute addition to a paper or report, the title plays a key role, as does the abstract. A good **title** is not too long and uses clear descriptive terms to provide a **concise and accurate description** of the **contents** of your **report**, using words that clearly describe the issue being discussed and establish the focus of the report. As **specificity** is important, you should try not to use unnecessary words, obscure words or rarely used abbreviations.

1.2 Abstract

An **abstract** is a section of **one paragraph** that tells readers what the report is about, briefly stating the main objectives, the methods used, then summarising the findings and finally stating the major conclusions and implications. An abstract can include a brief reference to theory but it should not include any numbers or data, your opinion or any other information that is not in the report. As it is an overview of ***what you did***, it is best to **write** your **abstract last** (see Bloc1 and Bloc2 Abstract writing workshops).

1.3 Introduction

The **introduction** states the **aim** of the problem investigated. It provides **background theory**, summarises **important research**, explaining key terms, formulas and concepts that will allow readers to **understand** the experiment and **why it is important**. It should try to establish a clear link between research, the experiment and your observations. If you are including a serious amount of introductory information, you should consider adding subheadings such as Theoretical Principles or Background

NB: Your instructors do **not** want you to simply **describe** or **repeat** what you have found in **the sources** but to show your own comprehension of the issue concerned.

1.4 Methods

The **methods** section should explain the **procedure**, briefly describing the **materials** and **equipment** used and the **steps** taken, ordered **chronologically**. It is important to **be as precise as possible** in terms of measurements, temperatures, amounts or times, so that others can replicate your work, if necessary.

1.5 Results

The **results** section is a key part, which should **summarise** your **observations**. It should briefly report the **main results** or **findings**, supported by sufficient data to justify the conclusions, and include any results that **agree or disagree** with **expectations**. Any figure or table included should be accompanied by a legend with a number, title and some sentences explaining it.

1.6 Discussion

The **discussion** section should explain what your observations mean and critically assess their implication in comparison with the experiment conducted. You can examine, interpret and qualify the results, agreeing or disagreeing, providing explanations for any (dis)agreements or unexpected findings, where they may come from or whether they could have been avoided. You should not only analyse the result but also look into the implications of your findings. However, you should try not to focus only oovergeneralise or speculate.

NB: The Results and Discussion section can also be **combined**, which is particularly useful when you have many results to discuss. You can then **present** your results **and discuss** them at the same time. This may make it easier on your audience to synthesise and interpret your **findings**.

1.7 Conclusion

This section should be **brief**, stating **what is certain** as a result of the previous. If the result is not as expected, your conclusion could also touch upon any shortcomings in experimental design and what could be done to improve on it.

1.8 References

Any **studies or research** used should be **cited in the appropriate place** in your report (see unit 4 *Using Sources* to organise your references and cite information properly).

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Some Advice:

Being **good at writing in general** will **not necessarily** make you **good at technical writing**. The reverse may also be true. You may be proficient at technical writing but not be particularly good at putting together a well structured report. You should therefore take the time to become familiar with this type of writing, since you are likely to have to write many such reports in future.

2. Organising your Report

After you have done the research and drawn up a working title, you should expand your ideas, developing each point and building it into a paragraph. Depending on the amount of information involved, some points may require more extensive development in the form of a series of paragraphs, while other points may be self-evident enough so that they can be grouped together in a single paragraph. What is important, however, is that the ideas should be ordered in a way that will produce the maximum effect on readers. The **three major parts** used to organize any report are the **Introduction**, the **Body** and the **Conclusion**.

2.1 Introduction

A good introduction **outlines** the general **background** to your science. It **clarifies** and **explains** the issue and **states** the aim of the report. It should have a **THESIS STATEMENT**, which acts as a unifying force. The introduction should **give** readers **insight** into how the report is going to develop. It should be **well written** so as to make readers want to continue reading.

2.2 Body

The body **develops** the **ideas** outlined in the **introduction**. Usually, each paragraph focuses on an important idea but some ideas may be subdivided and spread over more than one paragraph. T he **main point** of each paragraph is expressed in a **topic sentence**, which is then **explained**, **illustrated** and **elaborated**.

2.3 Conclusion

The conclusion **reinforces** what you have stated throughout your report. You should make sure of the **clarity and strength** of the information that you have presented in the body of your science, since this is your last opportunity to impress your readers.

3. Paragraph Structure

A good *paragraph* deals with only ***one central idea***. Good paragraphs are ESSENTIAL to a well-written paper. They help you to clarify your ideas and produce a logically structured piece of writing and enable readers to follow your train of thought. A **new paragraph** tells the reader that you intend to develop **a new idea or point**. Like reports, a paragraph has its own specific structure. A **typical paragraph** has a topic sentence, a development and a concluding sentence.

The **topic sentence**, which is often but not always at the beginning of the paragraph, introduces the topic, states the main idea to be developed and provides readers with enough information to follow the argument. The **development** then provides the necessary explanations, illustrations, elaborations etc. while the **concluding sentence** ends the paragraph and prepares readers for a smooth transition to the next paragraph, vital to paragraph unity and coherence.

3.1 Topic Sentence

Topic or focus sentences **play a** vital role **in writing a good paragraph**, which is why every paragraph should have (at least) one. The topic sentence links the remainder of the information in a paragraph to the report's main objective but it also determines the content of the paragraph. Topic sentences make a point, which the rest of the paragraph then explains, elaborates, illustrates etc. (see above)

3.2 Paragraph Length

Academic writing is often about evaluating information, making arguments etc., which is why paragraphs tend to be longer than in other types of writing. However, there is **no set length** for a paragraph and there are **no clear guiding principles**. The **length** of a paragraph can only be **determined** by the **type** and **quality** of the **information** in it and **by how it is organised**. Length alone says nothing about a paragraph's importance.

However, paragraphs can be **too short** or **too long**. Paragraphs that are too short, e.g. a paragraph of just **one or two lines** as can often be seen in newspaper articles, are not suitable to an academic report because they make it appear **fragmented and superficial**. If a paragraph is too short, you should check if the main idea in it has been properly developed. If this is not the case, you could improve on your writing by taking the too short paragraph and (1) **add the information to another paragraph** or (2) **make it longer by developing it further**, adding e.g. illustrations, giving examples or citing more evidence.

Conversely, if a **paragraph** is **too long** and even runs over pages, you should check to see if everything in it is linked to the main idea contained in the topic sentence or if you have just put in too much information that will make it **very difficult to follow your train of thought**. If this is the case, you may have lost focus and you should **subdivide** it into **shorter paragraphs** or **restructure the information** to focus on one idea in each paragraph.

4. Coherence

It is important is to make the link between your paragraphs clear. A well-written science report requires clear and logical transitions between the major parts *Introduction*, *Body* and *Conclusion*, between the paragraphs in the *Body* and also within the paragraphs themselves. If these connections are missing, your report may not be coherent.

Coherence refers to the unity created between the ideas and paragraphs to make your writing easy to understand. To provide structure to your report and guide readers through your reasoning, you should thus write coherent paragraphs. You should explain what your aims are, how you will achieve them, how your argument is structured and how your ideas relate to each other.

You can **create coherence** in your writing by

(1) organising information logically;

(2) using transitions, words, phrases and conjunctions to connect sentences or ideas;

(3) repeating keywords words or phrases;

(4) using lexical relations;

(5) using tenses and pronouns in a consistent manner;

(6) balancing grammatical patterns carefully.

1) *Organising Information Logically*

You can organise information logically by drawing up an outline, planning your report and ordering your paragraphs so that they move from one idea to the next. The best way to do this is to show how these ideas are connected.

2) *Using Signposts*

Signposting is the use of linguistic devices that signal how your argument is structured and how your ideas relate to each other. *Signposts* prepare readers for a change in the argument's direction and *signal important aspects* in a discussion or report, e.g. the aim, the writer's position on key issues, turns of thought, shifts in viewpoint or movements from one point to another, the direction of the argument, its conclusions.

Signposting language can be divided into **two broad categories**:

1. ***Majors signposts*** are phrases signalling key aspects of the discourse: the structure, the writer's position, the main points, the direction of the argument, conclusions.

Examples: This paper will argue that ... / Another key factor to consider is ... / The above raises some interesting ...

2. ***Linking adjuncts*** show links between ideas and sentences in discourse.

Examples: firstly / however / also / similarly / thus / by contrast …

NB: You should be careful not to overuse signposts but to save them for significant connections in the discourse that you want to call special attention to. Excessive use of signposts is universally considered as a lack of organisation in writing. It can also indicate an inexperienced writer's belief that they are necessary to make a text easy to follow.

3) *Repeating Key Words or Phrases*

Key words or phrases can be repeated to keep them in readers' minds. You can add variation by using a different grammatical form of a key word.

4) *Using Lexical Relations*

To remind readers of the topic without becoming too repetitive, you can also use the different types of lexical relations that exist between words as substitutes: e.g. synonyms, antonyms, hyponyms, expressions, phrases. However, do take note of the various differences in usage, collocations, register etc.

Example: The idea of *manipulation* can be repeated by using the verb *manipulate*, the adjective *manipulative* or the noun *manipulator*

5) *Using Tenses and Pronouns Consistently*

Coherence can also be created through **consistent use** of **tenses** and **pronouns**. Sudden shifts in time (mixing present and past) or in person (mixing singular, plural, first, second and third person pronouns) confuse the reader. When pronouns such as *this*, *that*, *they* and *it* are used appropriately at the beginning of a sentence or paragraph they make it possible to follow your train of thought if they correctly refer to a *specific noun* or *statement*.

6) *Balancing Grammatical Patterns Carefully*

Finally, careful balancing of simple, coordinate and subordinate structures is a great way to create a well-structured paragraph. Academic writing is far too often characterized by extremely long complex sentences. However, you should try to vary the length of your sentences and not include too much information in one sentence.