Flinders University

SLSS

READING SCIENTIFIC TEXTS

Scientific literature consists of many different components often divided according to the age of the information presented. The following shows the four major components and what they are used for.

Textbooks, reference books, handbooks of data	A good starting point for understanding a new field
Review articles and monographs of similar work done in a particular area of study	An overview of recent work in the field, useful as an indication of key issues in the field and areas for further research
Journal articles in current literature	Details from original studies, useful evidence or illustrations on which to base theories or opinions
Scientific abstracts and citations - a summary of current and historical information	A catalogue of information in a field, with reference details so that you can find and read the studies that are most relevant to your work

One of the most important skills you need to develop as a tertiary (science) student is the skill of reading. Some of the common concerns expressed by students when they first start reading scientific literature include concerns such as:

- having too much to read
- losing comprehension as they try to read more quickly
- being slow readers.

Succeeding at university means adjusting the way you read to overcome these issues. Reading everything at the same slow speed will not be the most effective strategy. To make reading easier and more effective:

- use different reading strategies to match your purpose for reading each text
- prioritise readings so that you read what is most important first.

Some more specific reading concerns for students are:

- reading about subjects with which they may not be familiar
- technical and scientific jargon
- translating academic language into normal English
- making meaning out of tables, graphs and other diagrams
- sorting out the things which are most relevant
- following and understanding the meaning of a complex argument
- dealing with contradictory information or views.

Many of these problems can be overcome or at least addressed by the use of an appropriate strategy, with time and with the development of your own reading skills.

One of the assumptions many students make is that the writer, being an expert in his/her field, must always be correct. This of course is by no means always the case. You, the reader, must learn to appraise the work of others objectively.

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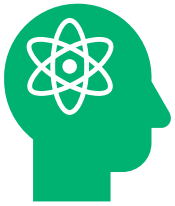
Here are some more detailed strategies which may help you get the most from the time and effort which you spend on your reading. These are not designed to be recipes for success, but more a starting point around which you can build your own methodologies.

KNOW YOUR PURPOSE

In scientific reading there will be several purposes for reading. A good reader will adapt his/her style accordingly.



- To locate some specific information in the text, say to decide which sections of books or articles best match different sections of your plan for an assignment, you might **skim read** (i.e. pass your eye quickly over the text picking up only enough to recognise what the text is about) until you see a relevant piece of information.
- To inform yourself generally, say before a lecture or before making a plan for an assignment on a new topic, you might **read steadily without noting** just to get the big picture.
- To gather material for an assignment you might **read sections very carefully, making notes** about specific ideas and examples you can use and skipping over material that is not relevant.
- To completely understand a particular experiment, say, where you have to make a presentation on an article to your class, you might **read the aims and methods first, making notes as a diagram,** then read the results.

READING ESSENTIAL TEXTS

In some courses there are set textbooks and you will be expected to read from these. Ideas from these texts can be hard to take in if you do not start with a mental framework for the ideas.

- Scan the **contents** page before you begin reading. It will give you an overview of what the book covers and what the authors thought was important. Look up the most essential terminology in a glossary or dictionary.
- Go to the **index** at the back. Pick out the key words or names you need to follow up.
- Read the **introduction** and **summary** sections of chapters. These will often provide a concise statement of the authors' intentions and major points.
- Skim the **headings** in each relevant chapter or section.
- Read the **first and last sentences** of paragraphs.
- Read the relevant sections of the whole work carefully, section by section, noting major points or **ideas in your own words** and recording which sections are of particular interest so that you can find them again later.
- Look at the information about the authors of the text and the date when the book was first published. This may help you to understand the authors' point of view and where their work fits in with other publications in the same field.

READING SCIENTIFIC TEXTS

READING JOURNAL ARTICLES

The reading of current literature in the form of journal articles is often the most daunting task for undergraduate students. The material is usually written by experts in the particular field and for other experts in that field. Do not let this put you off.

Reading should be in two stages. Firstly, try to discover the "meaning" by previewing the article.

- Look at the title: it should describe the study briefly.
- Read the abstract. The abstract (summary) is a concise overview of the article. It should contain:
  - the rationale for the study
  - the main results
  - how they were discovered
  - an interpretation of the results
- Look for these elements as you read the abstract.
- Read the summary/conclusions. If the abstract indicates the article may be useful, look for a section titled "summary/conclusions" and read it. If this section does not exist, skim read the discussion. As you read, ask yourself how this information can be used for your own purpose (i.e. Where does it fit into my assignment? How does it relate to the lab report I am preparing?).

FINAL CONSIDERATIONS

Having got a broad understanding of the article, you are now in a position to read it more closely if it is useful to you. In order to help you maintain concentration and understand the details, ask yourself another series of questions as you read:

1. What do I expect to find out from this section of the article (ie What can I already guess from previous experience and from previewing the text?)?
2. What is the overall aim or desired outcome of the experiments performed by the author? How is the study relevant to the specific issues addressed and also the broader issues?
3. What specific scientific problem is being addressed?
4. What methods have been used to investigate the problem?
5. What experiments have been performed?
   - What is the rationale behind the methods employed?
6. What specific methods were used?
   - What are the conditions under which the experiments were performed?
   - What are the limitations of the method?
   - Was there an adequate sample size?
   - Was there an adequate control?
7. What were the results of the experiments?
   - Are all results presented or only a representative sample?
   - Look carefully at all the tables and graphs and form your own opinion as to what they mean.
8. Are statistics presented? If so, are the statistical interpretations accurate and based on the experimental results?

9. The discussion section should give an interpretation of the results. Are these interpretations warranted, based only on the results presented? Are there any assumptions that have been made? What conclusions has the author drawn from the results and their interpretation?
10. Do the experimental results and their interpretation and conclusions answer the overall aim of the study?
11. Has the study contributed to an increase in the understanding of the area of study? What further studies should be performed? How may the results of the study be used in other related fields of study?

You may not initially be able to answer all these questions and may need to read the article several times, but the more questions you ask yourself, the more deeply you will understand the article. An additional kind of question that can help your understanding is to guess the meaning of words you don't know. Remember also to ask yourself any specific questions your lecturer has included in assignment instructions. If you are stuck on particular aspects of the experiment, the data or other things that you find difficult to understand, then **ask someone for help**.

Some students keep a logbook of articles they read. They note full bibliographic information, then they attempt to summarise the article, with the use of diagrams, using the above questions on one A4 page if possible.

Finally, the more you read, the more acquainted you will become with the language, style and terminology of the scientific material. With time, your reading speed, comprehension and critical appraisal of the contents will improve.

Hay, I, Bochner, D, & Dungey, C 2012, *Making the grade: a guide to successful communication and study*, Oxford University Press, Melbourne.
Marshall, LA & Rowland, F 2013, *A guide to learning independently*, 5th edn, Longman Cheshire, Melbourne.
Zeegers, P 1998, *An Introduction to the study of science at university*, 4th edn, Flinders Press, Adelaide.