Badji Mokhtar University, Annaba | Common Core, Sciences of Matter (L1)

Discovery of University Working Methods

Chapter 2: Learning to Read — Course Summary

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Learning objectives

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

- use the **paratext** to decide in five minutes whether a document is worth reading;
- **navigate** a book or an article to find its main argument without reading it line by line;
- read a **figure**, a **table** and an **equation** correctly;
- **capitalise** what you read with a **reading file**, and **classify** it.

Prerequisite: Chapter 1 (finding and referencing documents).

1 Using the Paratext to Judge a Document

Definition

The **paratext** *(paratexte)* is everything *around* the text: title, author, abstract, table of contents, headings, captions, references, index, date. It is not the content; it **announces** and **organises** the content. It is **free**: it costs 5 minutes, not 2 hours, and it tells you whether the 2 hours are worth it.

1.1 The paratext of a book

Element	What it tells you	Watch out
Title page	Real author, publisher, **edition**, year	Never trust the cover alone
Preface	For whom and why the book was written	–
Table of contents *(sommaire)*	The plan of the whole book; **"What does it cover?"**	–
Index *(index)*	Finds one notion in seconds; **"Where is *entropy* treated?"**	At the end of the book
Bibliography	Leads you to other documents	–
Back cover	A summary…	Written to **sell**; prefer the preface

Example. You need the definition of *enthalpy* in a 700-page book. Reading from page 1 is impossible; the index gives "enthalpy, p. 214" in 10 seconds.

Edition and date. A "4th edition" means the book was corrected and updated three times, so always take the **most recent edition**. But judge the date with care:

Subject	Old book?	Subject	Old book?
Classical mechanics	acceptable	Nanomaterials	no
General thermodynamics	acceptable	Experimental techniques	no

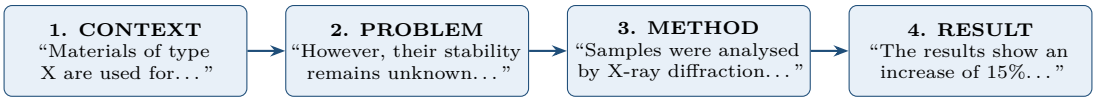
The rule

The rule is not "recent = good". It is: **the faster the field moves, the more recent the document must be.**

1.2 The paratext of a scientific article

Element	What it tells you
Title	Dense and technical: read it **word by word**
Authors + laboratory	A university: serious; a company: possible commercial interest
Abstract *(résumé)*	The most useful paragraph: problem, method, main result (about 10 lines)
Keywords	The vocabulary of the field: **improves your next search**
Headings	Always the same order (IMRaD), so you can jump to what you need
References	Often 40 other documents on your subject

The abstract always contains four things, in this order:

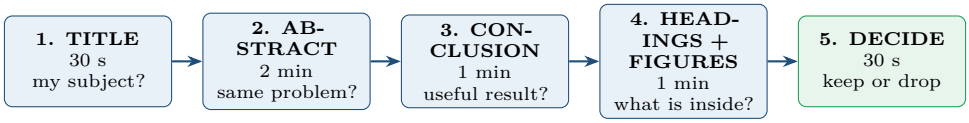


Signals to hunt for: *however, the aim of this work, we show, results indicate, we conclude.* **Decide from the abstract:** does the *problem* resemble *my* question? If not, stop here.

Same skeleton everywhere (IMRaD). Because the order is always the same, you can go straight to what you need:

If you want...	Go to...	If you want...	Go to...
the subject in general	Introduction	a value, a curve	Results (figures, tables)
to reproduce an experiment	Method	the meaning	Discussion / Conclusion

1.3 The five-minute relevance protocol



Note the strange order

Title → Abstract → **Conclusion** → Headings. You read the **end before the middle**: this is normal, and it is what scientists do.

Three possible decisions

DROP — not my subject. **PARTIAL** — one section only. **KEEP** — read completely. **Write the decision down:** an unwritten decision must be taken again.

Worked example. Need: *"a short synthesis on Newton's laws of motion."*

N°	Document	What the paratext says	Decision
1	D. Halliday, R. Resnick, J. Walker, *Fundamentals of Physics*, 11th ed., Wiley, 2018 (textbook)	Contents: Ch. 5 "Force and Motion–I"; recent edition	**KEEP** Ch. 5
2	D. Hestenes, M. Wells, G. Swackhamer, "Force Concept Inventory", *The Physics Teacher*, 1992 (article)	Abstract: tests the understanding of Newtonian concepts; useful for common errors	**PARTIAL** misconceptions
3	D. G. Cahill et al., "Nanoscale thermal transport", *J. Appl. Phys.*, 2003 (article)	Abstract: heat in nanostructures, not motion	**DROP**
4	"Newton's laws solved in one minute" (commercial site)	No author, no date, sells a service	**DROP**

Four documents are judged in **20 minutes** instead of eight hours, and two of them are exactly what you needed.

1.4 Traps of the paratext

Element	The trap	The reflex
Attractive title	May promise more than the article gives	Check the conclusion
Beautiful figures	Prove nothing by themselves	Read the **caption**
Long bibliography	Quantity is not quality	Look at the **dates**
Familiar words in the title	The article may be far above your level	Open the method section

The honest question

*"Can I understand this document **today**, with what I know?"* If not, keep it aside and find an **intermediate document** first. This is not a failure: it is method.

Figures and captions are paratext

A caption tells you **what** is measured, **against what**, and **under which conditions**. Read **all the captions** of an article, without the text: you get the story of the results in two minutes.

One method, two doors. The question is always "*is this document useful to me, now?*"; only the page you open changes.

Question	In a book, look at...	In an article, look at...
What is it about?	Table of contents	Title + keywords
Is it for me?	Preface	Abstract
Who wrote it? / Is it recent?	Title page, year + edition	Authors + laboratory, year
Where is my notion?	Index	Section headings
What else can I read?	Bibliography	References

2 Navigating a Document

2.1 four ways of reading

There is not one way of reading, but four. A good reader chooses the mode according to the question he asks the document.

Skimming *(lecture survol)*

Skimming is a very fast reading whose aim is to see **what a document contains**. The question is: "*What is in it?*" You look only at the headings, titles, introductions, conclusions and topic sentences while ignoring detailed information. It takes **5 to 10 minutes**. The purpose of this way of reading is to decide what the text is about and whether it is relevant.
The ability to skim effectively allows readers to navigate extensive information and identify crucial material, ultimately conserving valuable time.

Scanning *(lecture repérage)*

Scanning is the search for **one precise element** (a value, a definition, a name) without reading the rest. The question is: "*Where is X?*" Your eyes run over the page until they find the element. It takes **2 to 5 minutes**. This skill can come in handy because this way of reading does not concentrate on the general meaning or understanding every sentence. Scanning is especially useful in professional and academic environments where time is essential.

Extensive reading *(lecture extensive)*

Extensive reading is the practice of consuming large volumes of text to gain a broad, general understanding of a subject, grasp the "big picture," or simply read for enjoyment. In any field or language, it prioritizes the continuous flow of information over the micro-level scrutiny of specific details.
In Scientific Research: A researcher surveying dozens of abstracts and broad review articles to understand current trends in theoretical physics or astrophysics before deciding which specific papers require deep, intensive study.

Intensive reading *(lecture intensive)*

This is a careful, slow, and highly detailed process. For a first-year material sciences student, this is the most important skill for tackling academic subjects.
The Main Goal of this way is the Deep comprehension of both the scientific meaning and the language structure (grammar, exact terminology), alongside developing critical thinking.
The Methodology used is to Read shorter texts multiple times. You must extract and study new vocabulary systematically (e.g., recording the word, transcription, meaning, and a sentence example). Expect this to take 2 to 3 times longer than extensive reading.
The Best Materials for You are the Academic textbooks (Physics, Chemistry), lab reports, scientific papers, and exam preparation materials.

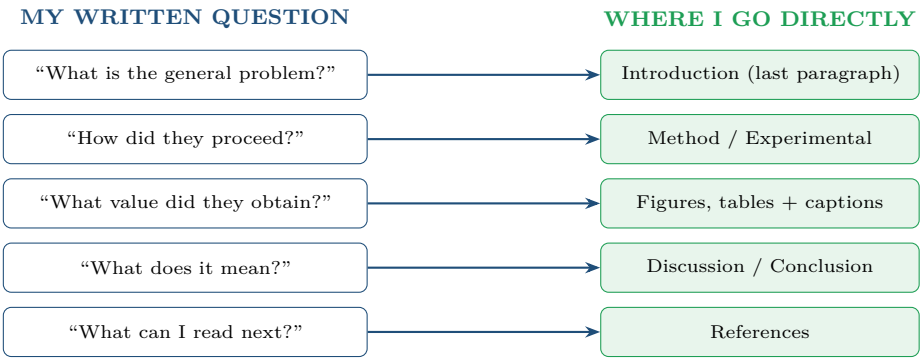
The mistake of the first-year student

Using close reading for **everything**, and therefore never finishing. A good reader **changes mode several times inside the same document**. A scientific document is not a novel: it is built to be **consulted**, not narrated. Jumping inside it is not cheating, it is using it correctly.

2.2 Circulate with a written question

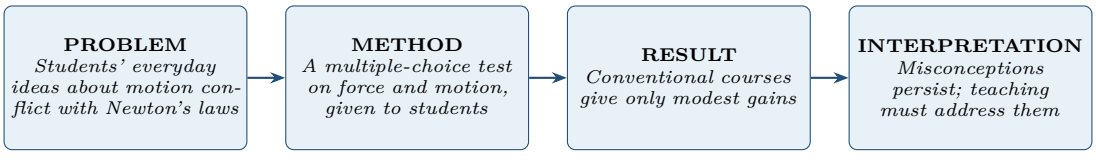
Never open a document without a written question: a reader without a question reads everything and retains nothing. The question decides the door, and the document does not decide for you.

If your question is "*What is the general problem?*", go to the **Introduction** and read its last paragraph, where the authors state their aim. If it is "*How did they proceed?*", open the **Method** (or *Experimental*) section. If it is "*What value did they obtain?*", look at the **figures and tables** and read their captions. If it is "*What does it mean?*", read the **Discussion** and the **Conclusion**. Finally, if it is "*What can I read next?*", go to the **References**.



2.3 Finding the argumentative core

Every scientific text, whatever its length, answers **four questions**. The **problem**: what was not known or not working? The **method**: what was done to answer it? The **result**: what was obtained (numbers, curves)? The **interpretation**: what does the result mean? The figure below shows these four steps on the article by Hestenes, Wells and Swackhamer of our worked example.



The training exercise: after reading, fill these four boxes in **one sentence each**. If you cannot, you have *read* the text but not *understood* it: go back. The same four boxes will structure your own laboratory reports.

2.4 Words that show the way

Authors use small words as road signs. When the author announces his **objective** (*the aim of this work, we propose, this paper presents*), **underline** the sentence. When he introduces a **contrast or a limit** (*however, nevertheless, in contrast, although*), **slow down**: a difficulty or a new idea is coming. Words of **cause and**

consequence (*therefore, consequently, because, thus*) tell you to follow the logic. An **important result** (*we found, results show, it appears that*) must be underlined. Words of **precaution** (*may, could, suggests, seems to indicate*) show a **doubt**: note it. A **conclusion** (*in conclusion, to summarise, finally*) must be read carefully.

Illustration: an invented short abstract and its signals

The aim of this work is to test how students understand Newton's laws. **However**, many students keep everyday ideas about force and motion. **We found** that scores rise only slightly after a conventional course. **Therefore**, teaching must address these ideas, and this **suggests** that new methods are needed. **In conclusion**, the test can guide teachers.

blue: objective, result, conclusion (underline, read carefully) • **red**: contrast or doubt (slow down, note the doubt) • **green**: logic (follow it)

A precious detail

"*may*", "*suggests*", "*could*" mean the author is **not certain**. Reporting such a result as a proven fact is a serious mistake.

One paragraph = one idea

The **first sentence** of a paragraph usually carries the idea; the rest gives proofs and examples. Read the first sentence of each paragraph, then go back only into the paragraphs that concern you.

2.5 Reading a figure, a table and an equation

A figure

Follow four reflexes, in this order. First read the **caption**: it tells you what is shown and under which conditions. Then read the **axes**: which quantities, **which units**, which scale. Then observe the **tendency**: does the curve increase, decrease or saturate? Finally look at the **error bars**: they show how sure the author is. In the figure below, the caption tells us that a cart is pushed by a constant force; the axes give time in seconds and velocity in $\mathrm{m\,s^{-1}}$; the tendency is a straight line, so the velocity increases by the same amount every second. Two frequent mistakes are to look at the shape of the curve without reading the axes, and to ignore the units. **A figure is an argument, not a decoration.**

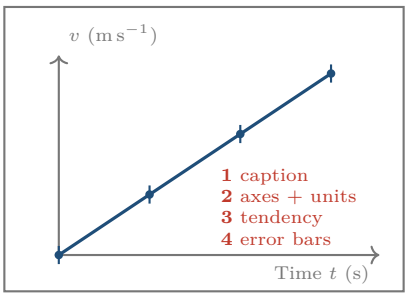


Fig. 4. Velocity of a 2.0 kg cart pushed from rest by a constant net force of 4.0 N on a frictionless track *(schematic)*.

A table

Read the **caption** first, then the **column headings** and their **units**. Find the largest and the smallest value, and ask what varies and in which direction. A table is read **by comparison**, never value by value. In the example below, the velocity grows by $2\,\mathrm{m\,s^{-1}}$ every second, so the acceleration is constant and equal to $2\,\mathrm{m\,s^{-2}}$.

Table 1. Velocity of the 2.0 kg cart under a constant net force of 4.0 N *(illustrative values)*.

Time t (s)	Velocity v ($\mathrm{m\,s^{-1}}$)
0	0
1	2
2	4
3	6

An equation

First identify **what is calculated** (the left side) and **each symbol with its unit**. Then ask: if this quantity grows, what happens to the result? Finally check the **conditions of validity** in the text around the equation.

An equation is a sentence; read it as one. Newton's second law, written for motion along one axis, is

$$a = \frac{F}{m} \qquad \text{and then} \qquad v = v_0 + a\,t.$$

Here a is the acceleration ($\mathrm{m\,s^{-2}}$), F the net force (N) and m the mass (kg); v_0 is the initial velocity and t the time. The first equation says: if the force doubles, the acceleration doubles; if the mass doubles, the acceleration is divided by two. It is valid for a constant mass, in an inertial frame, and for speeds much smaller than the speed of light. For our cart, $a = 4.0/2.0 = 2.0\,\mathrm{m\,s^{-2}}$, hence $v = 2.0\,t$, which is exactly Fig. 4 and Table 1.

2.6 Reading with a pen

Passive reading produces nothing, and two hours later nothing remains. In **active reading** you produce marks, questions and reformulations, using a simple stable code:

_____ key idea	**?** I do not understand	**!** important, surprising
→ to check elsewhere	∗ to quote in my report	

Never write on a library book: work on a photocopy, a PDF or a separate sheet.

3 Capitalising Knowledge: Reading Files and Classification

Definition

A **reading file** *(fiche de lecture)* is a short standardised document in which you record, **in your own words**, the essential content of a document **and its exact reference**. Without it, you remember almost nothing after three months and you read the article again (2 hours lost); with it, you recover everything in **3 minutes**. This is "capitalising knowledge".

3.1 Model of a reading file

Field	Content
1. Complete reference	**WHO – WHAT – WHERE – WHEN** (as in Chapter 1)
2. Type of document	book / article / thesis / web page
3. Theme, keywords	3 to 5 words
4. Problem treated	one sentence: what question does it answer?
5. Method	one or two lines: how was it done?
6. Main results	3 to 5 lines, **in your own words**
7. Useful quotation	one short sentence **between quotation marks** + **page**
8. My critical remark	clear? convincing? useful for my work?
9. Where I use it	"chapter 2 of my report" / "practical work on Newton's second law"

Two lines are never skipped: **line 1** (without the reference the file is unusable) and **line 7** (the quotation with its page protects you from plagiarism).

3.2 Classifying your files

Choose **one** system and never change it: **by theme** (thermodynamics, optics, materials; the most useful for a student) or **by author / alphabetical** (practical when files are numerous).

	Paper	**Digital**
Unit	one card per document	one file per document
Strength / risk	easy to spread out; can be lost	searchable; must be backed up

Name digital files `Theme_Author_Year` (e.g. `Conductivity_Atkins_2022`) and keep them in one folder, for instance `Reading_files`. A file you cannot find again is a file you never wrote.

3.3 A complete example

READING FILE N° 07 — 12 October 2026

Reference	HESTENES, D., WELLS, M. and SWACKHAMER, G., "Force Concept Inventory", *The Physics Teacher*, vol. 30, no. 3, p. 141–158, 1992.
Type / keywords	Peer-reviewed article (physics education); Newton's laws, force and motion, misconceptions, concept test
Problem	Students arrive with everyday beliefs about force and motion that conflict with Newton's laws, and these beliefs survive conventional teaching.
Method	The authors built the Force Concept Inventory, a multiple-choice test that compares Newtonian answers with common-sense alternatives, and gave it to students of several courses.
Results	A conventional university course raised the average score from 52% to 63%; a course designed around these misconceptions raised it from 42% to 78%. The most persistent errors concern the impetus idea and the "dominance" idea linked to Newton's third law.
Quotation	"..." (page of the quotation) *(a short sentence, copied exactly, with its page)*
My remark	Clear and easy to read; the test questions are good examples of Newton's laws. But it is about teaching, not a derivation of the laws: use it for common errors, and a textbook chapter for the laws themselves.
Where I use it	Section on common misconceptions in my synthesis on Newton's laws of motion.

4 Chapter at a Glance

Summary

- **You cannot read everything**: the skill is eliminating early.
- **Paratext**: book → contents and index; article → abstract and headings. Protocol: title → abstract → conclusion → headings → **decide** (drop, partial, keep), and write the decision down.
- **Navigating**: skim, scan, read intensively and extensively, and change mode often. Open a document with a **written question**; look for problem, method, result, interpretation. Read the axes and units before the curve.
- **Reading file**: your own words, exact reference, one short quotation with its page; **classify** it and back it up.
- **Sentence of the day**: *what you read is lost; what you write down is kept.*