



# Why textbooks?

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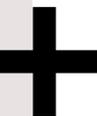
*Rotterdam, November 14, 2024*



Johannes Vermeer, *The Astronomer*, 1668

1713, it appears in Rotterdam

Adriaen Metius, *Institutiones Astronomicae & Geographicae*, 2nd ed. 1621. Libro III, About the observation of stars

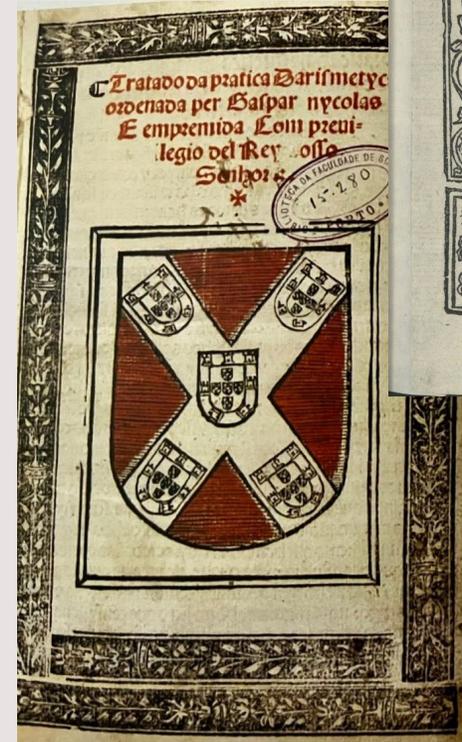


# From schoolbooks to textbooks

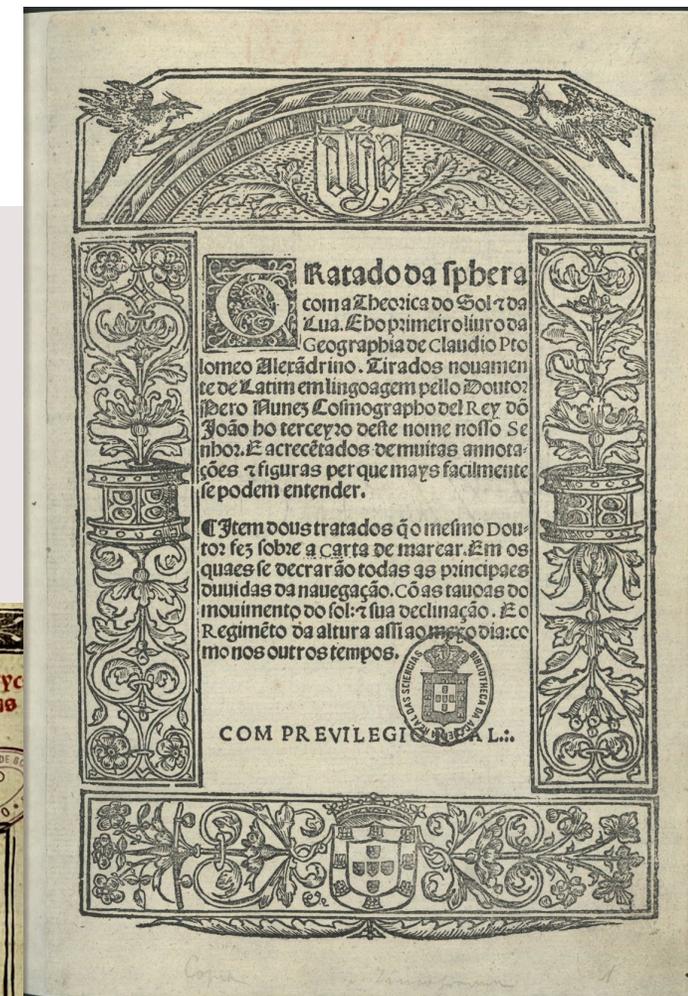
"In these handwritten forms, then printed, the school textbook is as old as the school itself" (Priouret, 1981, p. 187)

Gaspar Nicolas, *Tratado de Pratica D'arismetyca*, 1519  
He presented solved exercises without any explanation.  
Objective: "to automate [...] Solution Methods"  
"A long collection of recreational problems"  
"Mixed style [...] that survived in later treatises on similar topics" (Silva e Freitas 2023).

Pedro Nunes, *Tratado da Esfera*, 1537



ispício do volume impresso do *Tratado da pratica Darismetica* (1519)

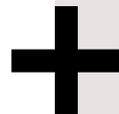


# From schoolbooks to textbooks

"The concept changed over the course of the nineteenth century from describing a book used in schools (among other places) to an educational medium produced explicitly for school education." (Sammler 2018, p. 16)

"The development of national education systems in the nineteenth century led to the creation of binding curricula. From that point on, textbooks were written to fit national curricula" (Id, p. 17).

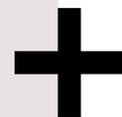
From schoolbooks to textbooks – from text! –  
to books to handle: Manuals!



# So, what's a textbook?

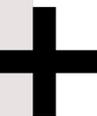
- (i) “ a [specific] **tool for the organisation** of the student's learning”
- (ii) “must take into account the user's **age group**, level of **cognitive development**, intellectual abilities, level of **previous knowledge** and experience, socio-cultural **background** and **purpose** in learning”
- (iii) “one of the elements in the design and **creation of the teaching situation**”

Ivič et al (2013, 1.4)



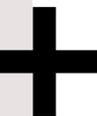
# Scant research on textbooks

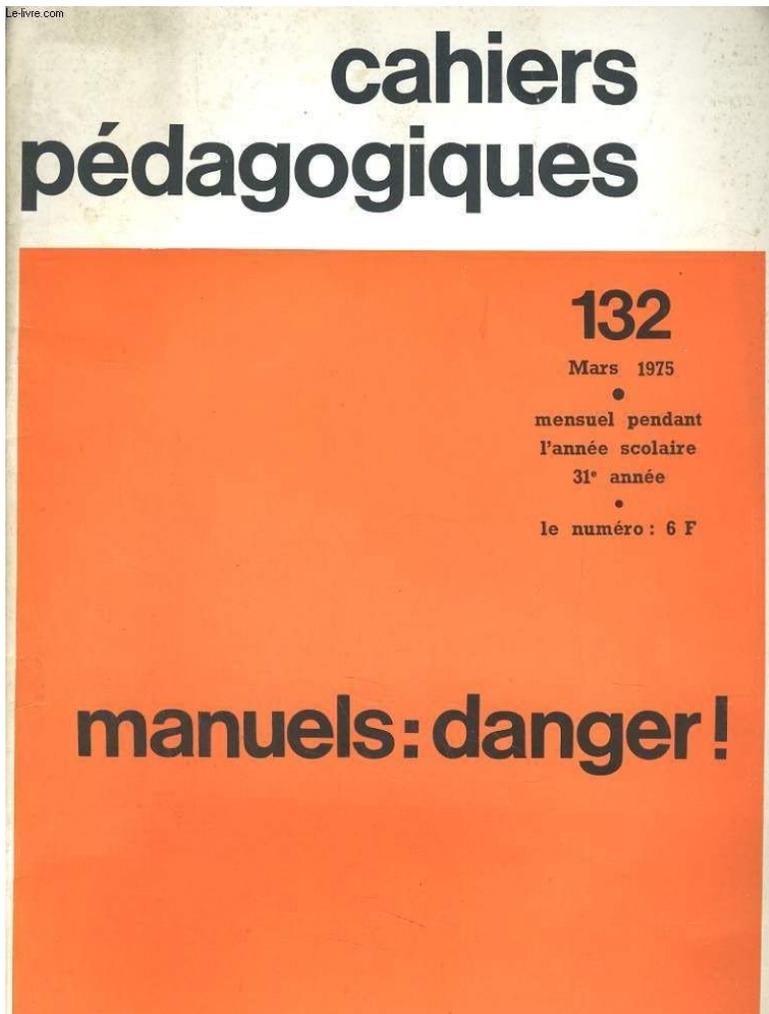
- “it is surprising that there is so little research on textbooks”  
(Woodward 1993, p. viii)
- “textbook research is extremely limited”  
(Foster 2011)
- “is a scantily theorised field”  
(Vera, 2018, p. 81).



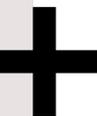
# Controversial research on textbooks

- “Textbooks [...] reflect basic ideas about a national culture, and [...] are often a flashpoint of cultural struggle and controversy.”  
(Altbach 1991, p.257)
- *Palgrave Handbook of Textbook Studies* (Fuchs & Boch 2018): **30** chapters  
  
(on war, misogyny, colonialism, environment... **17**)



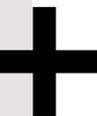


- Radical student-centred teaching doesn't value textbooks
- École nouvelle: « L'enfant qui compose un texte le sent naître sous sa main ; il lui donne une nouvelle vie, il le fait sien. [...] l'imprimerie à l'école [...] corrige ce qu'a d'irrationnel en éducation cette croyance que d'autres peuvent créer pour nous notre propre culture. » Célestin Freinet, *Le journal scolaire*, 1967.
- *Cahiers Pédagogiques*: “Manuels: Danger!” and “Apprendre sans manuels” 132, 164, 1975, 1978



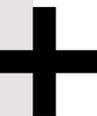
# The “flight from textbooks”

- Student-centred against *knowledge transmission*
- Emphasis on *method* and not on *content*
- Radical curricular reform in the US during the 1960’s: “Textbooks promote rote learning”
- Current western curricular trend to constant innovation, to curricular flexibility, and to local adaptation



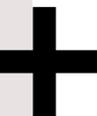
# But... are textbooks important?

- At the turn of the century: TIMMS and other ILSA:
  - “textbooks exert a strong influence on what teachers teach”.
  - “This seems to be true in most countries despite the difference in the nature and use of textbooks.”
  - “Textbook coverage is important both for what topics are taught”
  - “and for the levels of performance and accomplishment expected of students.”
- (Schmidt et al. 2001, p. 357).



# Yes, textbooks are important!

- Textbooks importance is greater when teachers have weaker knowledge
- PISA shows greater relevance for countries in which teachers are not well prepared (Wilkins 2011)
- TIMSS shows countries with better results use intensively textbooks (Mullis et al 2012, Oates 2014)
- Independently of teachers' quality, textbooks use is positive (Agodini & Harris 2016)

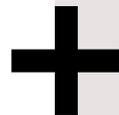


# Quality matters

RCT 131 teachers, 39 schools:

- Differences in textbooks can cause 30% s.d.
- In similar environments: 28% to 70% s.d.

(Agodini et al. 2009)

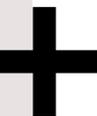


# Textbooks should be demanding

- In Portugal elementary schools, most teachers follow the typology of questions of the textbooks, but put the emphasis on the lower levels of questioning (Folgado & Araújo, 2009)

	Localizar e Retirar do Texto Informação Explícita	Fazer Inferências Directas	Interpretar e Integrar Ideias e Informação	Examinar e Avaliar o Conteúdo, a Linguagem e os Elementos Textuais
	Nível 1	Nível 2	Nível 3	Nível 4
<i>Pasta Mágica</i>	44%	30.7%	25%	0.3%
<i>Giroflé</i>	56%	26.5%	17%	0.5%
<i>Amiguinhos</i>	60%	24%	15%	1%
PIRLS	20%	30%	30%	20%

		Localizar e Retirar do Texto Informação Explícita	Fazer Inferências Directas	Interpretar e Integrar Ideias e Informação	Examinar e Avaliar o Conteúdo, a Linguagem e os Elementos Textuais
		Nível 1	Nível 2	Nível 3	Nível 4
<i>Amiguinhos</i>	Prof.1	81%	4%	15%	0%
	Prof.2	68%	7%	18%	7%
<i>Pasta Mágica</i>	Prof.3	28%	17%	47%	8%
	Prof.4	37%	27%	34%	2%



# APOLOGÍA DEL LIBRO DE TEXTO

Cómo escribir, elegir y utilizar  
un buen manual

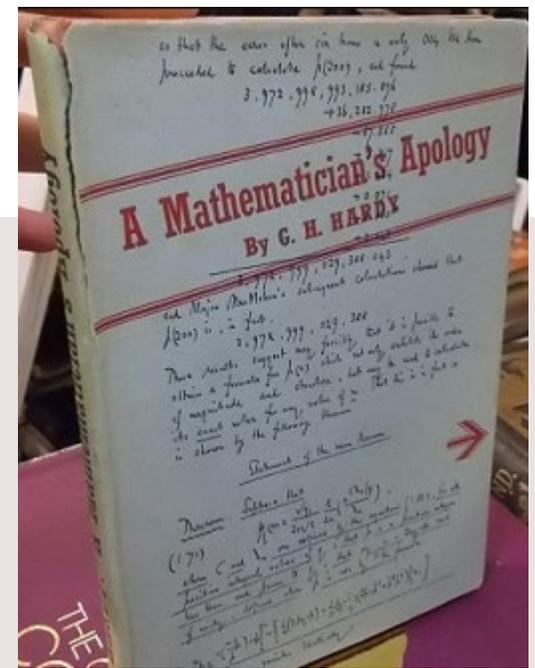
Nuno Crato

Política  
educativa



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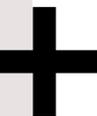
B



**Apologetics** (from Greek ἀπολογία, apología, 'speaking in defense') is the discipline of defending religious or philosophical doctrines through systematic argumentation (Wikipedia)

**Apologetics:** systematic argumentative discourse

**Apology** : an admission of error or discourtesy accompanied by an expression of regret (Merriam-Webster)



# Textbooks should translate the curriculum

Everything starts with the curriculum:

- Class content
- Desired learning outcomes
- Students' expectations
- Parents expectations and ways to help their kids
- Assessment, formative and summative

In a way, textbooks *are* the curriculum

## Textbooks' functions

Textbooks can translate curriculum structure and logic

It is important to understand how facts fit together. A collection of learning resources is no more a textbook than a pile of bricks is a house" (~William 2018)

A "tool for the organisation of the student's learning" Ivič et al (2013)

A tool for parents to help their kids

A precious students' tool to prepare for tests and exams

A reference for the future

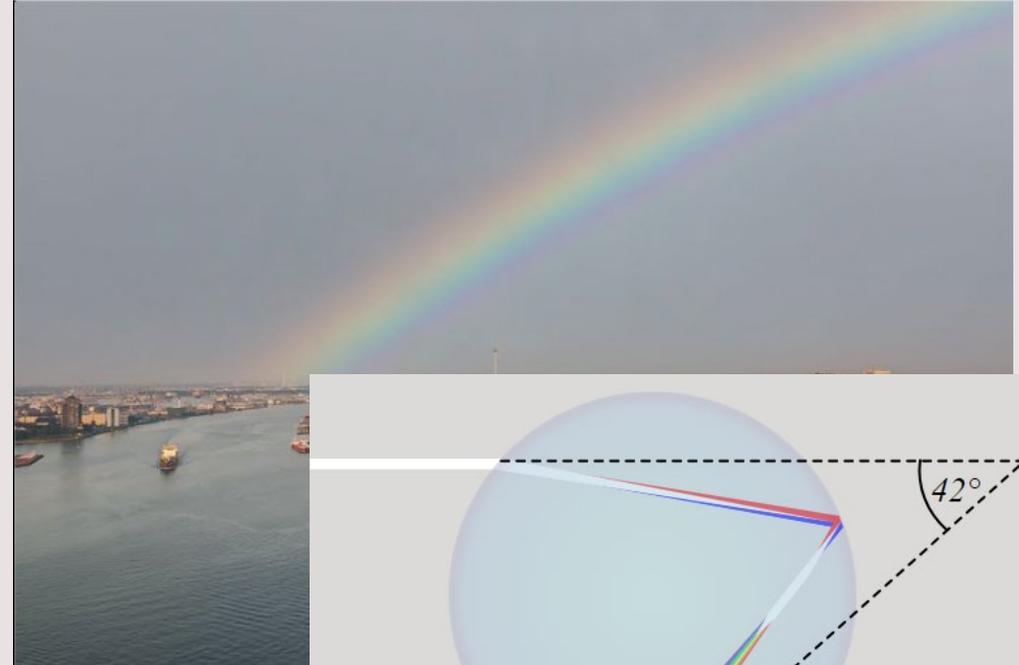
An "initiation into the world of intelligent reading" (Marsden 2001)

# What's a good textbook?

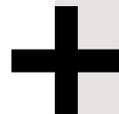
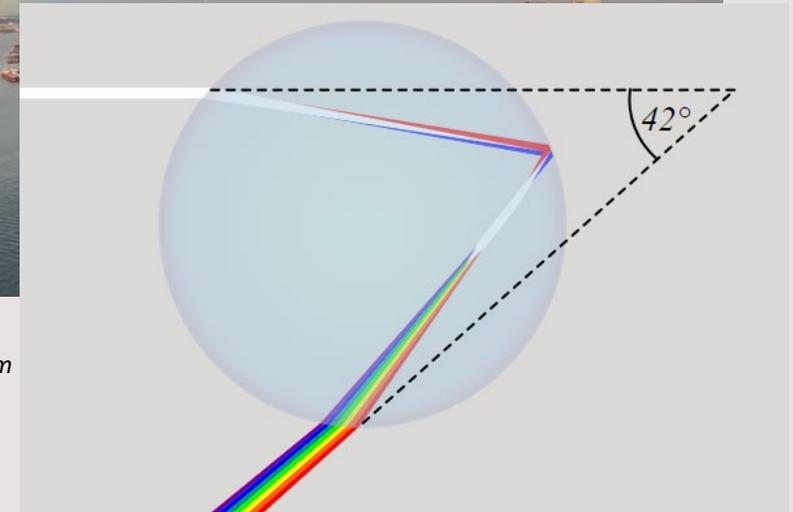
## Cognitive principles

### SEQUENTIAL PRINCIPLE

Concepts over concepts – integrating knowledge with previous knowledge



*Rainbow above Rotterdam*



# What's a good textbook?

## Cognitive principles

### SEQUENTIAL PRINCIPLE

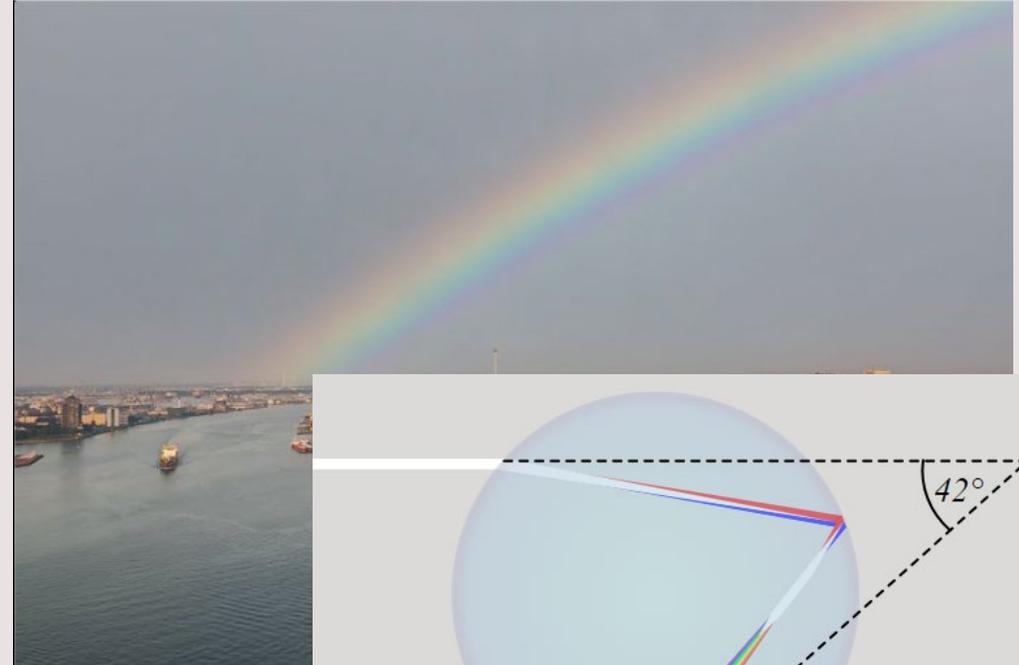
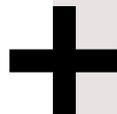
Concepts over concepts – integrating knowledge with previous knowledge

### COGNITIVE LOAD

Step by step

### SPACING

Wait for key concepts to be assimilated into long-memory schema



Rainbow above Rotterdam I

# What's a good textbook?

## Cognitive principles

### MULTIMEDIA PRINCIPLE

Paivio two channels idea

“Constellations are arbitrary, but help to organize the skies”



“Constellations are arbitrary, but help to organize the skies”



# What's a good textbook?

## Cognitive principles

### MULTIMEDIA PRINCIPLE

Paivio two channels idea

“Constellations are arbitrary, but help to organize the skies”

### COHERENCE PRINCIPLE

When explaining water is  $H_2O$ ...



# What's a good textbook?

## Cognitive principles

### MULTIMEDIA PRINCIPLE

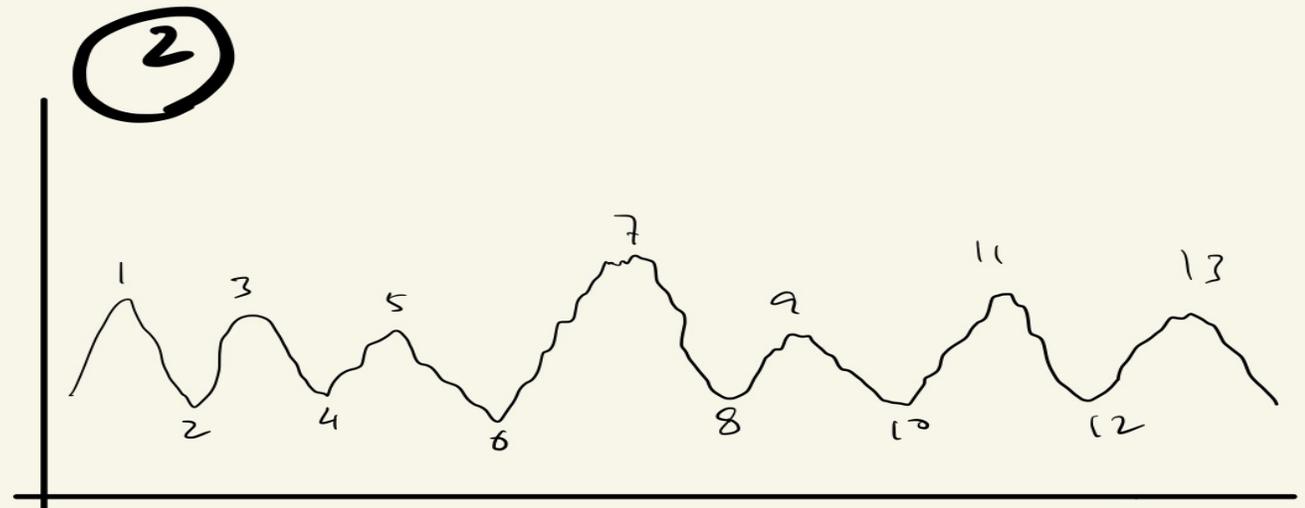
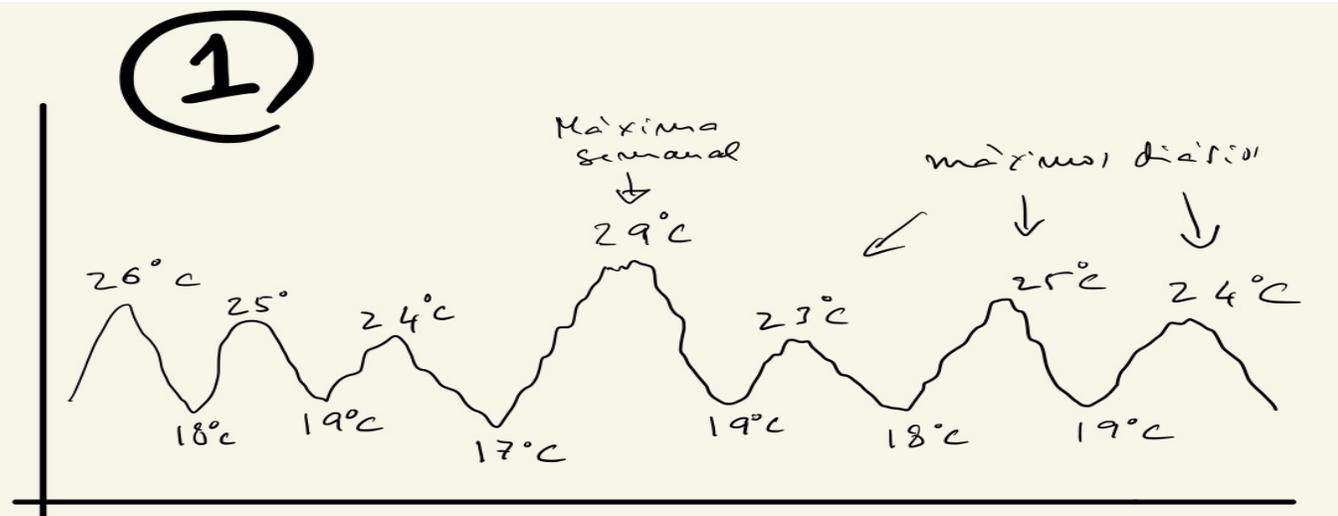
Paivio two channels idea

“Constellations are arbitrary, but help to organize the skies”

### COHERENCE PRINCIPLE

When explaining water is  $H_2O$ ...

### CONTIGUITY PRINCIPLE



1 = 26°C, 2 = 18°C, 3 = 25°C, 4 = 19°C, 5 = 24°C, 6 = 17°C  
7 = 29°C, 8 = 19°C, 9 = 23°C, 10 = 18°C, 11 = 25°C  
12 = 19°C, 13 = 24°C

7 → máx semanal

3, 5, 7, 9, 11, 13 → máx diario

# What's a good textbook?

## Good exposition principles

### SIMPLICITY

Simple sentences. Right to the point.

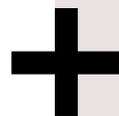
Concentrate on conveying the message

Use simple wording, but **precise**

Build precise and **rich vocabulary**

A **lightning rod** is an apparatus comprising a protracted ingot conjoined with a highly conductive medium that electrically interfaces the terrestrial plane. This contrivance functions to shield a comparatively dielectric edifice from the deleterious effects of atmospheric electrostatic occurrences

A **lightning rod** consists of a mounted stick on the top of a house tied to a wire that goes to the soil and so protects the house from lightening



# What's a good textbook?

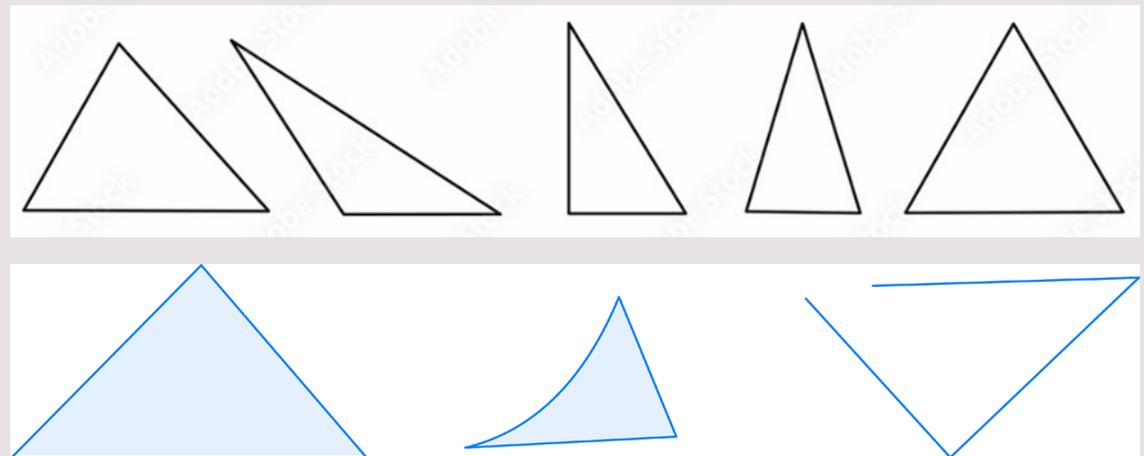
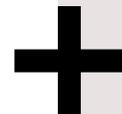
## Good exposition principles

### SIMPLICITY

Simple sentences. Right to the point.  
Concentrate on conveying the message  
Use simple wording, but **precise**  
Build precise and **rich vocabulary**

### ANTICIPATE AND AVOID AMBIGUITY

### DISCRIMINATIVE CONTRAST



# What's a good textbook?

## Active learning

### SPACING

Concepts reappear later

### RECUPERATION

Quizzes and exercises

### INTERLEAVING

Promote alternation

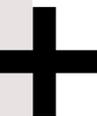
### ELABORATION

Suggest activities such as dialog reconstruction, explanations, summaries

**Students process information selectively and activate a mental representation of new knowledge**

**They are active when:**

- they select actively the information,
- organize it in a coherent mental representation,
- integrate it with previous knowledge



# What's a good textbook?

## Active learning

### SPACING

Concepts reappear later

### RECUPERATION

Quizzes and exercises

### INTERLEAVING

Promote alternation

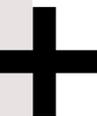
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# What's a good textbook?

## Promoting transfer

1<sup>st</sup> – to develop automatisms allows for more abstract thinking

2<sup>nd</sup> – to promote deep understanding – to see the relationships between concepts

3<sup>rd</sup> – to give varied examples

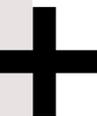
4<sup>th</sup> – to indagate and nudge into deep and not superficial connections – to see the general strategies common to different procedures

**We don't learn math studying Latin, neither we learn chemistry studying music**

**We don't learn critical thinking or other generic skills by focusing on critical thinking**

**PISA results also show “competencies”, i.e., application skills can't be developed by centring schools on application skills**

**But transfer is important: in a sense that's the holy grail of education**



# Textbooks' usage



## Good practices

- Follow textbooks *sequence* and *content* as closely as possible
- Use textbooks' *notations* and *definitions*
- Use textbooks *exercises*
- Refer to textbooks *frequently*
- Nudge students *to read* the textbook

## Bad practices

- Depart from textbooks in notation, order, and content
- Refer to textbooks sparsely
- Replace textbooks' content with sparse xerox copies or files



# Bad practices consequences?

Memorization of scattered facts

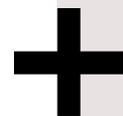
Vision of a discipline as a collection of tricks

Non-meaningful learning

Mechanical preparation for evaluations, followed by quick forgetfulness, i.e....

... valuing immediate performance rather than learning (Soderstrom & Bjork, 2013)

Students' boredom...



Devaluation of knowledge

# Principales referencias

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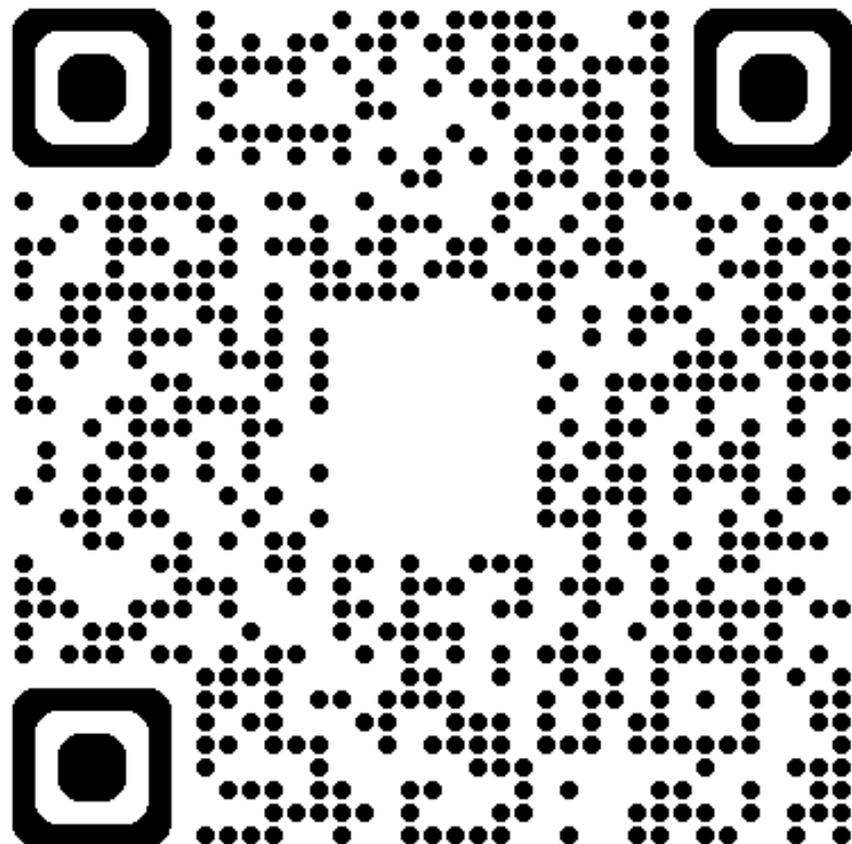
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**Thank you!**



Textbooks are among the most important tools in education.

Countries with high success, such as Singapore, are able to produce well-structured, high-quality textbooks, and on that basis, teachers are able to concentrate on classroom work rather than on preparing the sequence or preparing study documents.

Other countries despise textbooks and require teachers to do time-consuming organizational and preparation work—time that would be better spent preparing for classroom activity.

In countries with a centralised compulsory education system, such as Portugal and many others in central and southern Europe, to establish a systematic process of improving textbooks can help the whole system to progress.



# Questions for discussion

- What are the main obstacles to textbook promotion?
- Will all this change with digital textbooks?
- What should be the main points of textbook evaluation (and accreditation)?
- How can textbooks better serve students?

