Different textbooks in technology education – different opportunities for developing disciplinary literacy

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About us

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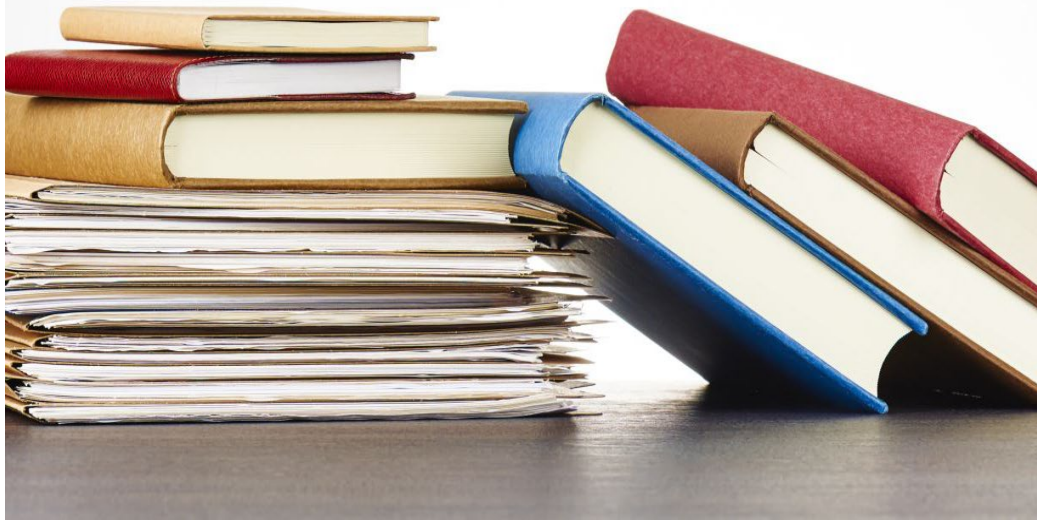
Background

- Textbooks are useful when students prepare for exams
- *Teachers in science and technology subjects appear to use textbooks to a great extent*
- Many textbooks lack incentives for reflective thinking
- *The language of the text is fundamental to how students can understand the text*
- Fact boxes and other types of text boxes that, despite looking appealing and interesting, create confusion for the student
- *The tasks in the book need to be perceived as relevant to the students and they need to be about something the students recognize*
- Analogue textbooks often function as reference books for students
- *The texts, images, tables, etc. in the books can present challenges for students*



Research question and aim

What characterizes the content of analogue technology textbooks regarding industrial processes with a focus on disciplinary literacy?

The aim:

- to investigate analogue textbooks in technology education
- to investigate what characterizes the content related to how instructional materials in technology provide students with opportunities to develop disciplinary literacy in the subject of technology - how and to what extent.

The focus:

- the central content of the lower secondary level (grades 7 -9/ages 13-16) in Sweden under the area of *Technological Solutions*: "Processing raw materials into finished products and handling waste in an industrial process, such as in the manufacturing of food and packaging" - *industrial processes*.

Disciplinary literacy

Every discipline or subject has specific purposes, genres, symbolic artifacts , communication traditions, different quality standards, and language usage.

School textbooks are part of developing literacy, as they provide a picture of the disciplinary literacy

A moment of reflection …

Can you, and if you can, how would you describe the disciplinary specific language/the disciplinary literacy of the subject of technology / *technological solutions*?

Method

Four commonly used textbooks (Book 1-4) for the lower secondary level (students age 13-16).

Pages dealing with industrial processes (20 pages/35 pages/34 pages/14 pages).

Analysis units: texts, headings, fact boxes, concept summaries, pictures and figures, concepts and terms

In order to:

identify patterns in the literacy of each textbook:

- if they differ and what they have in common.
- the characteristics of each book and what they offer to the student

discuss the presentation types offered by each book and what they do not offer.

Questions to the books 1-4

Headings: are the language, concepts and terms familiar?

Introductions : goals, what will students learn, the section's topic?

Texts: how is the content presented? Explanation/description ? Reflection / analysis?

Concepts and terms: purpose, quantity, explanation in running text/alongside the text, suggested practice?

Images and pictures : purposes – illustrative or clarifying the text?

Tasks: diagnostics, focus on concepts, assess understanding, require explanation/description, or involve reflection/analysis?

Results

Book 1:
Begins with a brief historical overview of a technical subject.

Utilizes direct addressing with the pronoun "you" and clear headings.

The main text is explanatory and descriptive with variations in language and structure.

Includes illustrative photographs to clarify the text.

Introduces and explains 21 concepts and terms, with the opportunity to practice eight of them.

Concludes with exercises and projects to apply the knowledge.

Book 2:

Begins with an introduction to technical systems and clear objectives for each section.

Utilizes direct addressing with the pronoun "you" and structured headings.

The main text is predominantly explanatory and descriptive with elements of reflection and analysis.

Includes illustrative photographs with descriptive captions.

Introduces and explains 18 concepts and terms with the opportunity to practice selected terms.

Offers continuous exercises and projects to apply concepts and terms.

Book 3:

Begins with an overview of focus areas and specific objectives for each section followed by a historical overview .

Uses varied headings with both familiar and new concepts and terms.

The main text is primarily explanatory and descriptive, with analytical and reflective elements in some sections.

Uses image captions to clarify illustrative photographs.

Introduces and explains 28 concepts and terms marked in the text.

Includes practical exercises and crossword puzzles to practice concepts and terms.

Book 4:

Begins with rhetorical reflection questions serving as an introduction to the chapter.

Uses short and varied headings, including both familiar and new concepts.

The main text is mainly explanatory and descriptive, with more reflective elements in sections on sustainable development.

Uses image captions to explain photographs and includes schematic sketches.

Introduces and explains 22 concepts and terms marked in bold.

Provides limited opportunities to practice concepts and terms.

In conclusion 1/4

The four books present various strategies to capture students' interest:

- Familiar content and clear language
- Historical or reflective narratives
- Introduction to unfamiliar environments

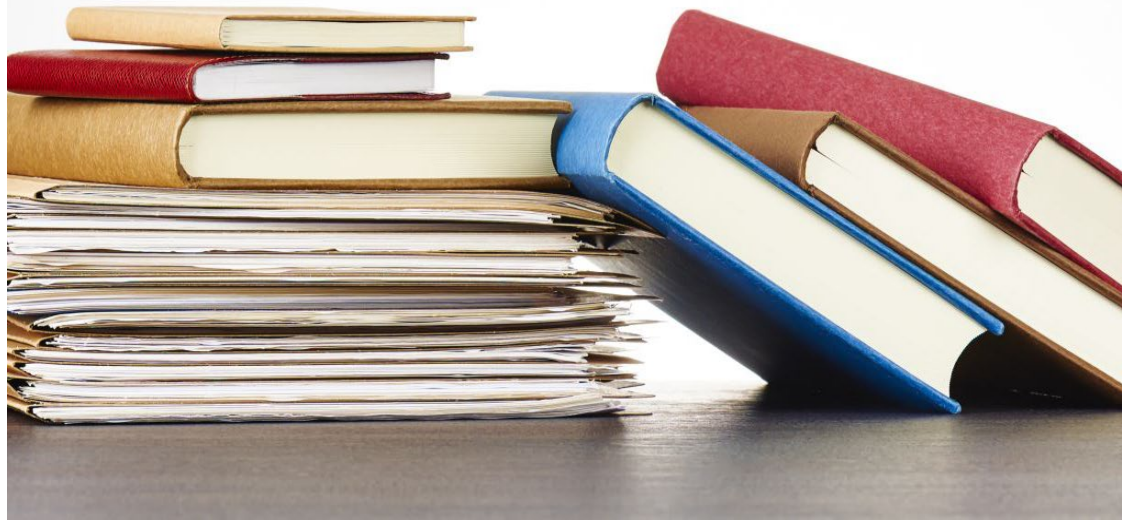
The textbooks use carefully selected photographs and sketches to clarify the text and enhance engagement:

- Captivating photographs in one book might make the interpretation challenging due to unconventional angles

In conclusion 2/4

Concepts and terms are important for development of disciplinary-specific language:

- New concepts and terms are introduced in the beginning of the chapters (3 of 4 books)
- 18 - 28 concepts and terms are presented in the four books - a majority of these concepts and terms are not the same
- It is important to provide opportunities for students to actively use and practice these terms – in the books there is an opportunity to practice only few of the concepts and terms and sometimes other concepts and terms than the highlighted ones



In conclusion 3/4

Each chapter or section ends with practice and diagnostic sections:

- A broad variation in content and depth across the textbooks
- An encouragement for students to comprehend and explain facts, and in some books, to reflect on or analyse problems

In conclusion 4/4

The language in headings and texts show a significant variation in the four books:

- short main clauses, frequently with a repetitive structure and new concepts and terms
- sentences with a variation of main clauses and subordinated clauses and an extensive vocabulary
- a language close to the oral language addressing the reader by “you” or “one”
- short interviews with “experts” with similarities to articles in newspapers

Presentation types:

- explaining/descriptive for technical topics and discussions
- reflective/analysing for texts about sustainable development and history of technology

Disciplinary literacy

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Our final reflections

The diversity in examples, descriptions etc within the textbooks results in:

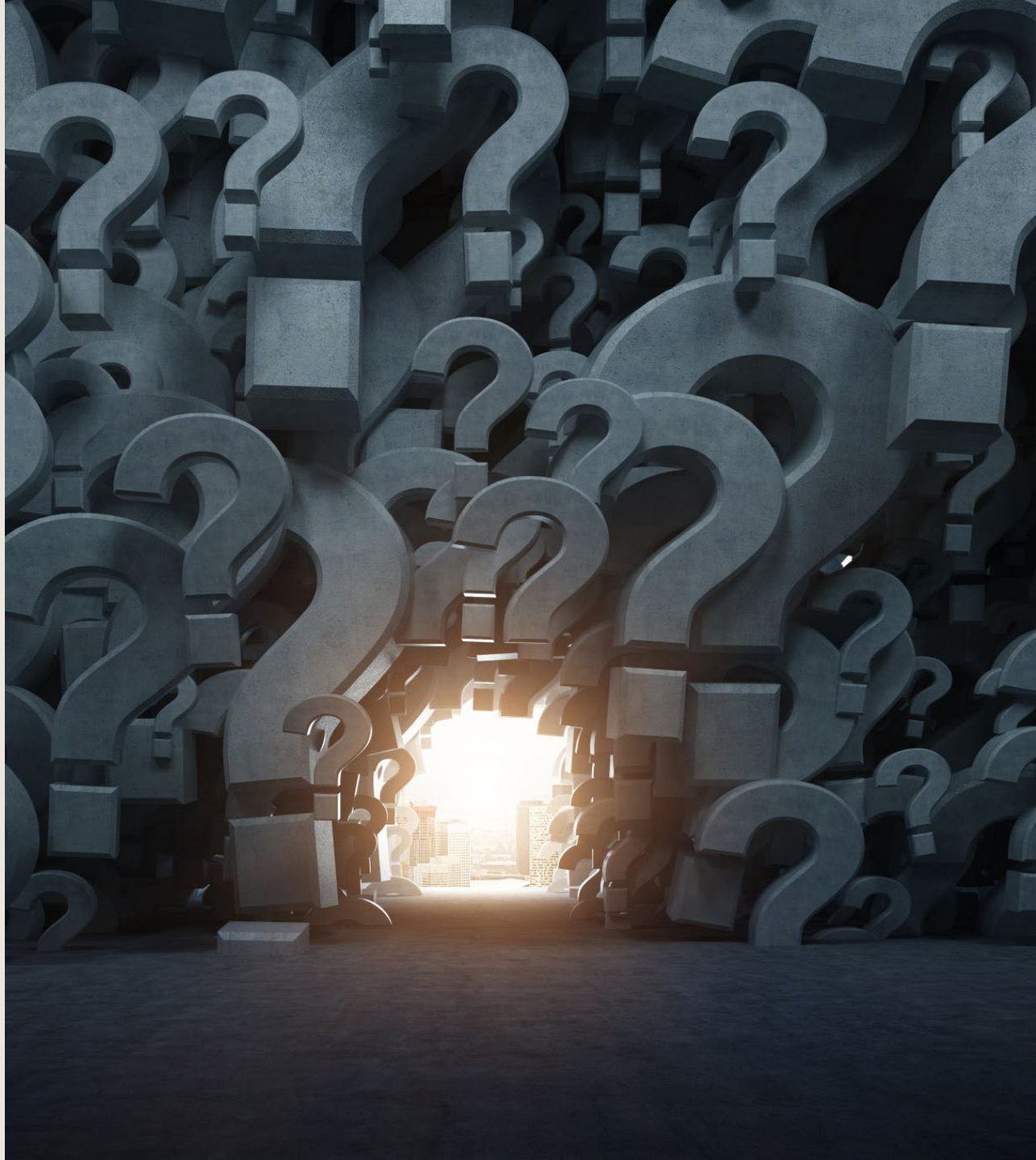
- Significant variations in students' knowledge of technology concepts and terms
- Significant variations in students' ability to explain and describe industry processes
- The variations pose challenges for teachers, who may encounter students with varying levels of technology knowledge
- The variations pose challenges for teachers who need to cover content and expected disciplinary-specific language in other ways

A moment of reflection ...

How would you describe the school textbooks that you have met or that you use for your teaching regarding disciplinary literacy?

How do you/how can you compensate for the variations in the textbooks in order to develop the students disciplinary literacy?

Time for your questions and suggestions



Thank you for listening !