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# INVESTIGATING UNDERGRADUATE PHYSICS LECTURERS' DISCIPLINARY LITERACY GOALS FOR THEIR STUDENTS

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# Overview



- Background
- Why disciplinary literacy?
- A possible definition
- Research questions
- Data collection and analysis
- Four common themes
- Conclusions

# Background

## Book

### ***Global Developments in Literacy Research for Science Education***

Chapter discussing the concept of  
disciplinary literacy

(see Airey, 2011a, 2011b, 2013 and the extensive  
overview in Moje, 2007)

## **Why not use scientific literacy?**

The term scientific literacy was introduced by Hurd (1958)

Critiqued by Laugksch (2000)

The term is undefined and difficult to pin down.

Means different things to different people

Researchers should define what they mean when they use the term.

# Why not use scientific literacy?



Decided to use a new term Disciplinary literacy

Following Laugksch's advice I will present my own definition of disciplinary literacy

Start by returning to the term literacy

## What is literacy?

Gee (1991) suggests that we have one primary discourse (the **oral language we learn as a child**) and many secondary discourses (**specialised communicative practices** used in other sites outside the home).

Gee defines Literacy as 'fluency' in these secondary discourses.

# What is disciplinary literacy?



## Definition

The ability to appropriately participate in the  
**communicative practices** of a discipline.

(Airey 2011a)

# Communicative practices in physics



We can partly **talk** our way through a scientific event or problem in purely verbal conceptual terms, and then we can partly make sense of what is happening by combining our discourse with the **drawing** and interpretation of visual **diagrams** and **graphs** and other representations, and we can integrate both of these with **mathematical formulas** and **algebraic derivations** as well as **quantitative calculations**, and finally we can integrate all of these with actual **experimental procedures** and **operations**. In terms of which, on site and in the **doing of the experiment**, we can make sense directly through **action** and **observation**, later interpreted and represented in **words**, **images**, and **formulas**.

Lemke (1998:7)

# What is disciplinary literacy?

1. Disciplinary literacy involves not just reading and writing but also **other multimodal skills**
2. Disciplinary literacy depends on **where** you intend to use these skills.

# Disciplinary literacy triangle



Society



Disciplinary  
Literacy



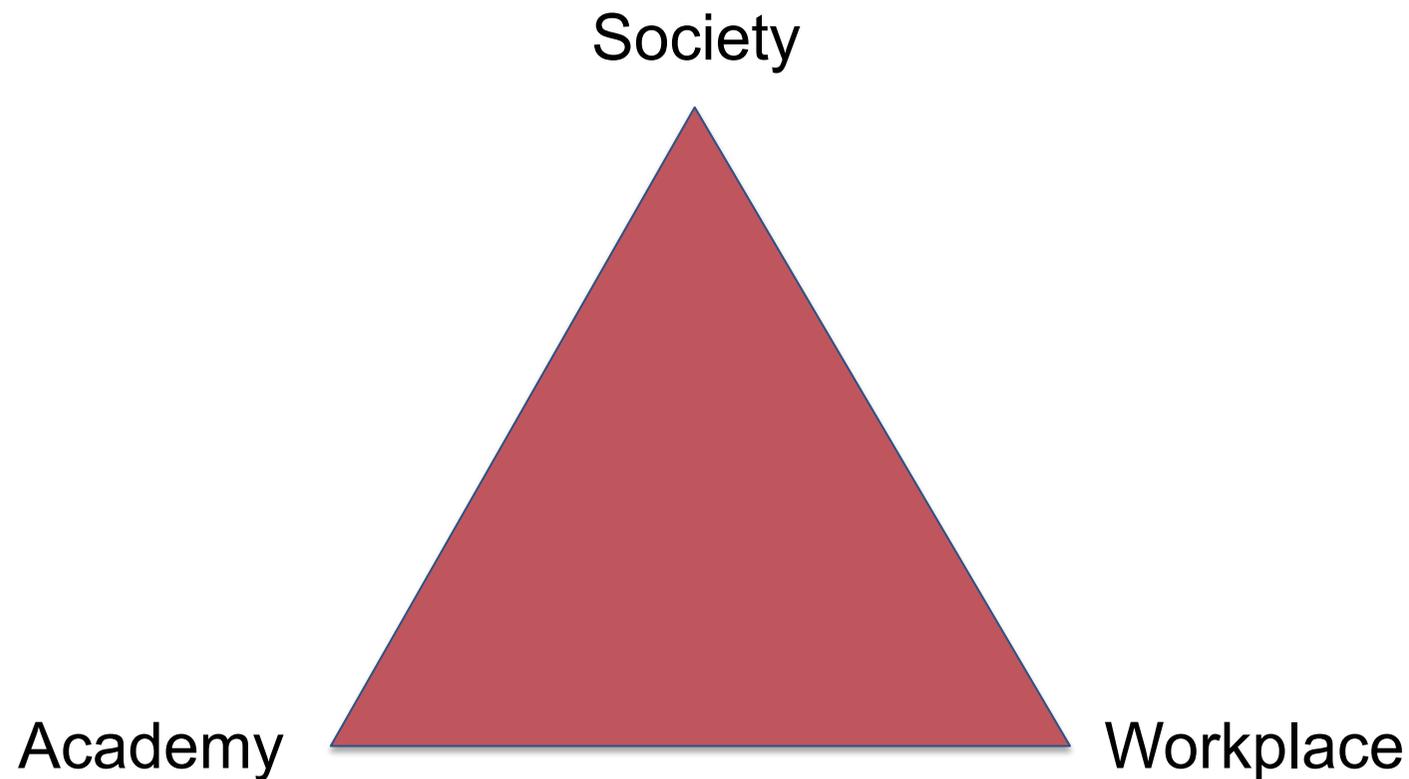
Academy



Workplace

# Disciplinary literacy triangle

Three sites where disciplinary literacy is used



# Disciplinary literacy triangle



Two further observations:

Each communicative practice has an **interpretive** and a **generative** form

When using disciplinary literacy in Sweden and South Africa the choice of **language becomes important**

# Using disciplinary literacy



Used the concept of disciplinary literacy to investigate physics lecturers learning goals for their students.

## Research questions

1. What do physics lecturers at universities in Sweden and South Africa say about disciplinary literacy in terms of the range of semiotic resources they want their students to learn to master?
2. Do physics lecturers take responsibility for the development of this disciplinary literacy in their students?

## Data collection

30 university physics lecturers

9 universities

Sweden (4)

South Africa (5)

Semi-structured interviews (45 mins - 1 hour)

Used a **Disciplinary Literacy Discussion Matrix** to stimulate discussion

# Disciplinary Literacy Discussion Matrix



		Where for?		
		Physics	Job	Society
Graphs	interpret			
	use			
Tables	interpret			
	use			
Diagrams	interpret			
	use			
Mathematics	interpret			
	use			
→	interpret			
	use			
→	interpret			
	use			
→	interpret			
	use			
Language	Reading			
	Writing			
	Listening			
	Speaking			
	Reading			
	Writing			
	Listening			
	Speaking			
	Reading			
	Writing			
	Listening			
	Speaking			

# Analysis

## Qualitative analysis:

Involves “working with data, organizing it, breaking it into manageable units, synthesizing it, searching for patterns, discovering what is important and what is to be learned, and deciding what you will tell others”

(Bogdan & Biklen 1992: 145)

Transcripts of the interviews were read and re-read in an iterative process looking for patterns.

## Results

- Very similar responses in both countries
- Those differences in answers that do exist seem to be based on personal choice rather than something that is dependent on the country or the institution
- Suggests the culture of physics as a discipline is strong.

# Results



- Analysis resulted in four themes

# Physics $\neq$ disciplinary literacy

- Teaching physics is not the same thing as developing students' disciplinary literacy

*“These are tools, physics is something else. Physics is more than the sum of these tools it’s the way physicists think about things—a shared reference of how to analyse things around you”.*

# Students need everything!

- Disciplinary literacy in a range of semiotic resources is necessary for learning physics

Lecturers ticked almost all the boxes!

Unremarkable been commented on by many researchers (e.g. Airey, 2009; Lemke, 1998; McDermott, 1990; Parodi, 2012).

# Not my job!



- Developing disciplinary literacy is not really the job of a physics teacher

## Not my job!

*"As a physicist I'm not there to solve the problem of the maths. They must be able to understand the maths sufficiently at that level and know why...I'm not there to teach maths, they must go to the maths department if they need to learn it"*

*"Scientific language is something that someone who is reasonably intelligent can pick up ... so my own feeling is if I can do it others can do it"*

*"My goals must be directed towards the content'  
If I had to concentrate on the language I would have terrible results"*

# Actually I do help them...

- Some teachers were prepared to take responsibility for the development of certain aspects of students' disciplinary literacy

*So we would explain to them how to plot a graph, heading, labels—I mean our students don't know this!*

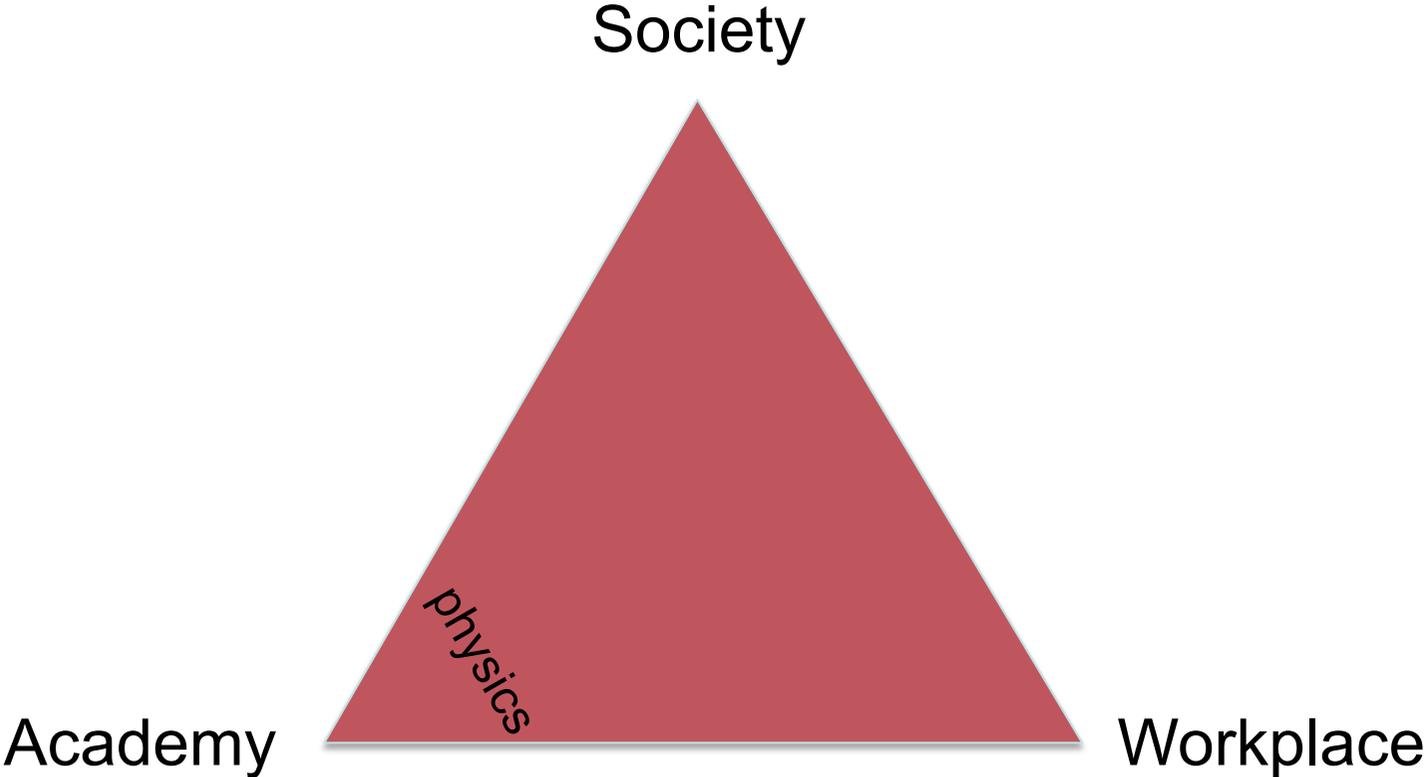
*Most people when they start out writing scientific literature don't know how to write and the writing process takes some coaching*

## One final theme

- The kind of disciplinary literacy lecturers said they were interested in developing was for the academy

*What I teach, society doesn't really need to know—it would be nice if society knew and understood ... but you don't have to know it.*

# Disciplinary literacy triangle



# Conclusion

Until lecturers see their role as one of socialising students into the discourse of their discipline... [they] will continue to insist that they are not [teachers of disciplinary literacy] and that this should be a job for someone else.

(Airey, 2011b, p. 50)

# Ongoing work



Applied disciplinary literacy

Looking at other disciplines

Particularly interested in teacher training

# Questions?