Science via Narratives
Communicating science through literary forms

• Can we remember scientific information included in fictional stories?

Aquiles Negrete-Yankelevich
Science via Narratives
Communicating science through literary forms

Aquiles Negrete-Yankelevich
Fact via Narratives

Content

• Research Question (The Plot)
• Background (Why it is interesting?)
• Methodology (How I am studying it?)
• Findings (What I found)
• Conclusion (My interpretation)
Fact via Narratives

Research Quest.

- Can we communicate science through fictional narratives?
- What are the differences of learning through factual texts *versus* fictional stories?
Science Education

• Science textbooks have been privileged over other means in science education, but in fact science and technology are represented in the media such as radio, television, magazines as well as in music, cinema and a diversity of examples in fictional literature (Gough 1993, Appelbaum 1995, Weinstein 1998 and Weaver 1999).

• If we are to educate society in and about science as Nunan and Homer (1981) propose, we have to treat all of the cultural media of science equally.
Challenge of Science Communication:

- Establish a bridge between science and the general public.
- Translate science into common language so the reader becomes interested and excited.
Fact via Narratives

Content

• Research Question (Plot)

• Background: (Why it is interesting?)

• Methodology (How I am studying it?)

• Findings (What I found)

• Conclusion (My interpretation)
Methodology:

- Two short stories with scientific content were adapted to be no more than 2 A4 pages.

- Questionnaires were used to evaluate the amount of scientific information individuals learnt from the stories (measured through memory tasks: recognise, recall and contextualise. Stainberg 1998).
Fact via Narratives

Study:

• 40 individuals.
• Two groups.
• One group read the stories and the other the list of facts derived from them.
• Both answered the questionnaires.
• One week later. (questionnaires)
Fact via Narratives

Study: Design

Story 1

Facts 1

One week later

Story 2

Facts 2
Fact via Narratives

Study:

The Stories:

- Nitrogen by Primo Levi
- The Crabs Take over the Island by Anatoly Dnieprov

(Narrated by: Irwin Scott)
Fact via Narratives

Content

• Research Question (Plot)
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Fact via Narratives

Study:

Differences in time:

Retell-Nitrogen

Retell-Crabs

Stories
Facts

Facts 1
Fact via Narratives

Study:

Differences in time:

Remember-Nitrogen

Remember-Crabs

Stories

Facts
Fact via Narratives

Study:

Stories versus Facts in time:

- Stories vs Facts Nitrogen W1
- Stories vs Facts Crabs W1

- Stories vs Facts Nitrogen W2
- Stories vs Facts Crabs W2

Graphs show comparison between Facts and Stories in terms of Retell, Identify, Remember, and Context.
Study:

Stories versus Facts in Time:

The factual group experienced a statistically significant decrease in score in all the tasks from one session to the other ($t(15)=5.899, p<.001$), while the narrative group presented a gradual drop in performance (which was not significant).

![Bar chart showing comparison between stories and facts in nitrogen and crabs tasks across two weeks.](chart.png)
Fact via Narratives

Study:

Stories versus Facts in Time:

(Hypotetical)
Can you distinguish in the stories what is scientific knowledge and what is fiction?

**Learn - Narrative Group**

**Fiction vs Science Narrative Group**

- 90% No
- 5% Other
- 5% Yes

**Fiction vs Science - Factual Group**

- 29% No
- 29% Other
- 42% Yes
Fact via Narratives

Content

- Research Question (Plot)
- Background (Why it is interesting?)
- Methodology (How I am studying it?)
- Findings (What I found)
- Conclusion (My interpretation)
Discussion and Conclusion:

The results of this study as a whole suggest that:

• Science can be learned through literary stories and that this represents an important means for science communication to transmit information in an accurate, memorable and enjoyable way.

• That narrative information is retained for lengthier periods than factual information in long-term memory.
Discussion and Conclusion:

The results of this study as a whole suggest that:

• There is a relationship between how central to the development of the story the scientific information is, to how memorable it becomes. In other words, as the scientific information is closer to the important moments of the narration, higher in hierarchical respect to the plot, it is more likely to succeed in communicating and making such knowledge memorable.
The results of this study as a whole suggest that:

- People remember and retell information quoting verbatim literary phrases, analogies, metaphors and irony. These verbatim quotations suggest that people retain information when this is presented in an attractive way to them. Apparently the literary effects mentioned above enable to evoke emotions in the reader and therefore information linked to this emotional response results more memorable.
Fact via Narratives

Discussion and Conclusion:

Science through short stories... for whom?
Discussion and Conclusion:

Science through fictional narratives for whom?

- Children
- Special Education (dyslexia)
- Teaching all education levels
- Communicating science to the general public
Fact via Narratives

Discussion and Conclusion:

What fictional literature can do for science communication:

- Generate stories as models to explain science (Lotman)
- Help people to understand and remember scientific information for lengthier periods of time compared with traditional non-narrative texts.
- To present science as it is developed including the emotions, errors and risks involved.
- To provide the public with an interface to learn science in an accurate, trustworthy, enjoyable and in a dialogical way.
We are:
the friends we have met,
the books we have read
and
an infinite number of
subtractions…

Sergio Pitol
Fact via Narratives

Background:

Science Communication

Transmit: (Dornan 1990)

• information (+)

• maximum fidelity

Questions: (Durant et al 1989)

• which scientific information

• how should it be communicated
Fact via Narratives

Discussion and Conclusion:

Retelling analogies, literary phrases + irony

- “He only ended smelly, dirty, with a nasty brown liquid but not Alloxan.” (organic chemistry)
- “Mater as mater, neither noble or vile” (Nitrogen)
- “Put animal excretion on their lips” (the use of Alloxan)
- “What happened then was too terrible to be told” (the outcome of the experiment)
Fact via Narratives

Study:

Dispersion of the data:

Dispersion of Data S vs F

STD

Stories

Facts

Nitrogen

Crabs