

Science fact in sci-fi

By HEATHER VOSKUYL

Abstract

This is a study of 50 year 8 science students' reactions to exploring science fact in science fiction. This year, it was taught to two mixed ability classes, by two teachers and one teacher librarian. The unit was taught over six weeks.

Students are assessed on their thinking skills (skills in analysis and synthesis), not on their reading skills (the fluency and depth of their reading or their aesthetic appreciation of a literary work) or their writing skills. Students create a PowerPoint presentation (maximum of two slides), which they use to help them explain their findings to the class.

Analysis of the feedback from students indicates that they found the analysis difficult and challenging but also interesting. We continue to refine the task each year as we teach it, but our experience has been overwhelmingly positive.

Background

This unit was taught in collaboration with classroom teachers as a component of *Explorations*, which is a non-selective science course for students with a passion to explore outside the boundaries of the NSW science syllabus. Open-ended and extensive investigations are central to each lobe.

Our aim was to encourage a love of reading and to stimulate critical thinking. The head of science and I wanted to include a study of science fiction in the *Explorations* course. Encouraging the girls to read widely in a genre that is not very popular was an implicit goal; challenging the girls to critically analyse and reflect on what they read was the explicit focus.

Aims

- To encourage analytical thinking.
- To scaffold the skills needed to synthesise information.
- To stimulate speculation about future scientific developments.
- To heighten awareness and understanding of how science affects their daily lives.
- To develop ICT skills by demonstrating how to use PowerPoint as an adjunct in an oral presentation.
- To encourage the reading of science fiction.

Philosophy

We wanted our students to enjoy reading their chosen novel or short story and to apply their knowledge of science. In effect, we challenged them to extend their reading skills, to adopt the position of a transformational reader. Michel Pecheux developed a framework in *reader theory* that described three positions a reader could adopt: an obedient reader, a resistant reader and a transformational reader. These positions are not mutually exclusive; they describe a choice the reader makes at a particular point of time. A transformational reader gains an understanding from a story that does not subvert the author's intended meaning but was not part of the author's purpose.

Our belief is that we read because it helps us to make sense of our world. This task modelled reading strategies that encouraged our students to read widely and to reflect on their reading. We rewarded them for making connections between fictional worlds and the world of science. The students made choices about what to read. We hope we made them conscious of the choices they can make about how they read.



Heather Voskuyl is the head of library at Queenwood School for Girls in Sydney, a K-12 independent school with about 850 students. She has taught in various schools (state and independent) and locations (Australia and Papua New Guinea). Her passion is fiction and she reads voraciously. Her doctoral thesis explored how the authors of award-winning Australian young adult novels represented adolescence and hailed their adolescent readers.

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Science Fiction || Science Fact

The Novel

Slide 1

Identify the science

Explain how the science is used in the story:

(tool / machine / transport?
effect on the way people live ... ?)

The Science

Slide 2

How does it work now?

What do experts predict may happen in our future?

> Conclusion

How much science fact was in the science fiction novel you read?

Planning

In preparation for this task, I developed a science fiction (SF) collection that included titles that could appeal to students aged 13–15 with a wide range of reading abilities. I bought adult SF classics, collections of SF short stories, abridged novels, graphic novels and young adult novels. This was challenging and it did take some time. All SF formats that are text-based were acceptable. I deliberately sought out anthologies of SF short stories, graphic novels and abridged classics to meet the needs/preferences of those students who either did not like reading or who found reading challenging (or both).

Each student was given:

- an assessment handout (see *Appendix 1* page 7)
- a printed bibliography of the SF texts that are in our library
- a handout on *science fiction* (see *Appendix 2* page 7).

Lesson plan

- Introduce task. View episode one of the animated television show *Futurama*. Discuss the contrast between the world Fry leaves and

the one he wakes up in. Did the writers get it right? Browse and borrow texts.

- Read (at least two weeks but no longer than a month).
- Draft presentation (at least two lessons). Students need lots of guidance here.
- Allow time for reflection, then present to class.

Assessment

Our students were assessed on their oral presentation in which they explained their analysis of whether science was in fact integral to the novel. Their PowerPoint presentation was limited to two slides. The first illustrated how a scientific principle was applied in the fictional world. The second illustrated (based on their research) that this same principle operates in our world. The speaker then concluded with an evaluation of how *scientific* their sci-fi novel actually was.

Conclusions

The barriers we faced included:

- a dislike of reading
- a dislike of thinking

- a reluctance to leave the safety of *cut and paste*
- disbelief that only two PowerPoint slides were allowed (no title page and no complete sentences — key points only).

This task challenged all participants. The more able participants were challenged to demonstrate their more sophisticated understanding. Less able students recognised that this task was difficult but they could complete it, with our help (see handouts). Feelings of anxiety (and some resentment) diminished as we offered support and guidance. Most students gained an enhanced positive understanding of their ability as learners. In their feedback, some students were aggrieved because there was no way of fudging their response but we regarded this as a success.

Following on from this task, the girls were engaged in a creative activity in which they designed their own superhero (after researching superheroes in film and text).

Appendix 1

Is science fiction also science fact?

Task: Investigation

Method: Case study

Step 1:

- Define science fiction and locate some examples.
- You will receive the following resources to help you:
 1. A handout about science fiction.
 2. A bibliography of science fiction books.
 3. An introduction to the science fiction world of *Futurama*.

Step 2:

- Select your novel.
- See Mrs Voskuyl if you need assistance choosing a book.

Step 3:

- Read your novel (you have *one* month).
- Make notes relating to the scientific principles that appear in your story (use the science fiction handout as a guide).
- These notes are for *you* but Ms Lean or Mrs Jones may check them to see how you are going.
- Discuss any problems you're having with analysing the science in the fiction *now* with Ms Lean, Mrs Jones or Mrs Voskuyl.

Step 4:

- Research the science fact in your novel.
- You will have two lessons in R107 to ensure that you can locate information on the scientific principle used in your book.

Step 5:

- Present your findings in a *two-minute* oral presentation to the rest of the class (*two* weeks later in class).
- Format: PowerPoint (two slides maximum!)
- You can use images ... but you cannot have more than two slides. This is a *thinking* exercise.

Guidelines for your PowerPoint presentation

Slide 1: Fictional world

Choose one of the scientific principles used in the novel (from your notes). Explain the scientific principle and its importance in the world of your novel.

Slide 2: Our world

Explain the scientific principle as it applies in *our* world. In your answer, decide whether the fictional world you investigated was based on science fact.

Your PowerPoint presentation must be on your thumb drive or in the U drive prior to the start of the lesson. You will not be allowed to log in to your R Drive to access your presentation.

Effective PowerPoint presentations are ...

Look at these websites for hints on how to make your presentation better:

- Creating an Effective PowerPoint
<<http://mason.gmu.edu/~montecin/powerpoint.html>>
- How to give a good PowerPoint presentation
<http://everything2.com/index.pl?node_id=1134342>
- Making PowerPoint slides
<<http://www.iasted.org/conferences/formatting/Presentations-Tips.ppt>>
- Making good PowerPoint presentations
<<http://www.soars.ucar.edu/documents/writing%20workshop/Making%20good%20ppt%20presentations.ppt>>

Appendix 2

Science fiction

Erin Pierce: *Science fiction allows us to step beyond our own world to discover more about this world. As we stand in lands forged in someone's imagination, we also confront the realities of this world.*

What is science fiction?

Stories that are based on current or future scientific and technological developments. Examples are Jules Verne's *20,000 leagues under the sea* and Ray Bradbury's *Fahrenheit 451*.

Science fiction stories cannot be completely unbelievable. Science fiction wonders about the effect of new discoveries and scientific developments on us in the future.

Every science fiction story has at least *one* of these features:

- technology and inventions
- the future and the remote past, including all time travel stories
- other places — planets, dimensions, etc., including visitors from these places
- catastrophes — natural or man-made.

While reading your science fiction story, ask yourself:

- Does the story focus on any particular area of science? (the weather, genetics, space travel, overpopulation)
- Does he/she give you any details or clues that help to explain how their world was created?
- Can you identify the scientific principle(s) the author used?
- Do any items in the story exist now?
- How did we get there from here?

Look carefully at:

- people (houses, clothes, work, leisure, schools)
- place (location, time, weather)
- technology (or lack of it).

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Marking criteria		Marks Available
Number of slides in PowerPoint presentation		
- Two slides only		1
- More or less than two slides		0
Length of presentation		
- 1.5 to 2 minutes		1
- Less than 1.5 or greater than 2 minutes		0
PowerPoint presentation on thumb drive or in U drive		1
PowerPoint presentation		
- Clear and easy to read		1
- Appropriate amount of content on each slide		1
- Slides related to topic		1
Oral presentation		
- Appropriate volume		1
- Appropriate body language		1
- Regular eye contact		2
- Occasional eye contact		1
- No eye contact		0
Explanation of scientific principle from the novel		
- Detailed explanation of scientific principle		2
- Simple explanation of scientific principle		1
- No explanation		0
Importance of scientific principle in the world of the novel		
- Detailed explanation of importance		2
- Simple explanation of importance		1
- No explanation		0
Importance of scientific principle in our world		
- Detailed explanation of importance		2
- Simple explanation of importance		1
- No explanation		0
Conclusion as to whether principle was based on science fact		
- Detailed conclusion		2
- Simple conclusion		1
- No conclusion		0
How convincing the argument is		
- Very convincing		2
- Marginally convincing		1
- Not convincing at all		0
TOTAL	20	

Useful websites:

- Go to <<http://technovelgy.com/>> to find out about *science facts* that once only existed in the realm of *science fiction*.
- To find out how a writer of science fiction integrates science fact into his fiction go to <<http://www.sfwriter.com/ow03.htm>> where author Robert J Sawyer explains how he researches his stories.