Appropriate levels of communication

In this activity students pick out what makes a science story accessible and learn how to write at an appropriate level for a particular audience.

Outcomes

Students will be able to:

- write successfully for a desired audience
- use the Gunning fog index (GF index) to analyse their own writing.

Time required

1 hour lesson time

Outline of the activity

In linguistics, the GF index is a test designed to measure the readability of a sample of English writing. The resulting number is an indication of the years of formal education that a person requires in order to understand the text easily on the first reading. That is, if a passage has a GF index of 12, it has the reading level of a year twelve student. The test was developed by Robert Gunning, an American businessman, in 1952.

The GF index is generally used by people who want their writing to be read easily by a large segment of the population. Texts that are designed for a wide audience generally require a GF index of less than 12.

It is important to consider how important the GF index is for different audiences.

Start off with extract 1 and extract 2 on the briefing sheet ('Scintillate' and 'A research team') and ask students to work out what they think both mean. Tell students they are likely to know both as famous nursery rhymes, but they are difficult to recognise because of the style they're written in ('Twinkle twinkle' and 'Jack and Jill'). They can use the dictionary (or thesaurus) to help them.

Some more examples of these texts are available on 'If scientists wrote nursery rhymes': http://www.rfcafe.com/miscellany/humor/scientists_nursery_rhymes.htm.

Once students have worked these out, ask them to get into twos or threes and using the three different pieces of text provided (see 'Resources required') work out the GF index for each. Run through how to calculate the GF index as given on their worksheet.

Ask students then to choose a paragraph of their own writing, and find out the GF index, and say what they think about this. Have a discussion about their answers to the final questions on their worksheet. Do students think that scientists have a responsibility to make themselves understood – to all, or just other scientists? Do all scientists understand all science?

Tips and strategies

It is useful to comment on, and get students to comment on the style and clarity of texts they engage with in their studies. This encourages a more critical appreciation of written style.

Appropriate levels of communication: briefing sheet

In this activity you will examine texts using the Gunning fog index (GF index) to measure ‘readability’ for an audience.

Part 1 What makes you choose a particular book/magazine to read?

Would you be looking for the same qualities when choosing to read science-based material?

Have a look at the following two extracts. Place a cross on the scales given below, to show your assessment for the extract. Use a different colour for each extract. Give reasons for your answers.

Extract 1
Scintillate, scintillate globule aurific -
Fain would I fathom thy nature specific
Loftily perched in the ether capacious
Strongly resembling a gem carbonaceous.

Extract 2
A research team proceeded toward the apex of a natural geologic protuberance, the purpose of t expedition being the procurement of a sample of fluid hydride of oxygen in a large vessel, the exact size of which was unspecified. One member of the team precipitantly descended, sustaining severe fractural damage to the upper cranial portion of his anatomical structure. Subsequently, the second member of the team performed a self-rotational translation oriented in the direction taken by the first member.

Easy to understand	Difficult to understand
Enjoyable to read	Boring to read
Expecting too much prior science knowledge	Not expecting too much prior science knowledge
Expecting a high level of general vocabulary	Not expecting a high level of general vocabulary
Expecting a high level of science vocabulary	Not expecting a high level of science vocabulary

Appropriate levels of communication: briefing sheet

What nursery rhyme does each extract refer to?

Extract 1: ___________________________

Extract 2: ___________________________

Have a look at the three pieces of scientific text supplied and work out the GF index. The GF index is an equation you can use to find out how many years of formal education someone needs to be able to understand your writing. The lower the number, the younger the audience could be and therefore the largest audience you could have.

To do this, you need to:

1 Randomly select about 100 words of text.

2 Find out the average sentence length by dividing the total number of words by the number of sentences.

3 In the same section, count all the words that have more than three syllables.

4 Then find the percentage of complex words by dividing the number of complex words (found in stage 3 above) by the total number of words in your chosen section and multiply by 100.

5 Add together the average sentence length and percentage of complex words.

6 Multiply your answer by 0.4.

GF index = 0.4 x ([average sentence length] + [percentage of complex words])

Now that you have worked out the GF index for all three texts, what can you say about each of them?

Text 1: __________________________

Text 2: __________________________

Text 3: __________________________

Appropriate levels of communication: briefing sheet

Rewrite one of the passages using language that you consider is simpler and clearer. Recalculate the GF index for the passage. Discuss your original and edited passage with your group. Is it always a good thing to use the simplest possible language?

Find a piece of your own scientific writing. What is your GF Index? How does it compare with the three texts above?

Part 2

In pairs, discuss the following:

1 Is it important to write in a way that all people can understand?

2 What makes a piece of writing interesting, apart from the actual subject content?

3 Do scientists have a responsibility to make themselves understood
- by the general public?
- by other scientists?

4 Do you feel you need to improve your writing style? If so, why? How will you do this?

Appropriate levels of communication: resources

Gene therapy success 'reverses' blindness

28 April 2008

Experimental gene therapy trials have improved the vision of four people who suffer from hereditary blindness.

The preliminary results of two independent studies suggest that "repair" genes delivered to the eye might one day cure Leber congenital amaurosis (LCA), a rare disease that strikes about 1 in 80,000 people in the UK, and 2,000 Americans in total.

Equally important, say researchers, the treatments proved safe in the six patients who received the genes – delivered by a disabled virus – via eye surgery.

"This is really an exciting result for gene therapy as a field," says Katherine High, of the University of Pennsylvania Medical School in Philadelphia, who was part of an international team that presented the findings at a conference yesterday.

Another team led by Robin Ali, of University College London, presented similar results.

Dog success

In High's trial, the vision of all three patients improved noticeably, while one of Ali's patients saw well enough to navigate an obstacle course in dim light – a task that had been a struggle before the treatment.

While extremely rare, LCA is a debilitating disease that strikes patients at birth. As their retinal eye cells die off, most patients become completely blind by their 30s.

Mutations in at least six genes cause LCA, but both teams treated patients with a mutated version of a gene called RPE65, which is responsible for about 6% of cases.

In 2001, scientists reversed the blindness of dogs born with the same mutated gene. A harmless virus called adeno-associated virus injected a working copy of RPE65 to the animal's retinal cells, kicking them back into action.

Speedy improvement

After proving the treatment safe in other animals, including primates, each team gave the modified virus to three LCA patients in their late teens and early 20s.

"They were not completely blind, but they were severely visually impaired," says Jean Bennett, a colleague of High's at the University of Pennsylvania. For instance, patients could see a hand waving in front of their face, but most had trouble reading any letters on an eye chart.
After receiving surgery to inject the virus into one eye – the weakest – all three of Bennet and High's patients noticed quick improvement.

They saw better in dim light, and two patients could now read the first three lines on an eye chart. One patient, who fumbled through an obstacle course before the surgery, had few problems navigating after treatment.

Youngest benefit

So far only the youngest of the three subjects in Ali's trial, an 18-year old man named Steven Horwath, has had improved vision after surgery.
"Before the operation, I used to rush home from college when it started to get dark because I was worried about getting around," he says. "Now I can take my time and stay later at college if I need to, for band rehearsals and things like that," he says.

Less subjective tests that gauge the eye's response to a tiny flash of light also indicated that patients' treated eyes had improved.

Both teams plan to test the therapy on younger patients who might regain even more of their sight. "I think the effect will be most dramatic in younger individuals, when the retina has not degenerated so extensively," Bennett says.

Turning point

The treatment also seems safe. Patients in both studies showed little immune response to the virus, a problem in some previous gene therapy trials. And the virus seemed not to stray from the eye region.

One patient in Bennett and High's study, a 26-year old male, developed a microscopic hole in his retina after surgery. The treatable complication didn't worsen his vision, but it could be a problem for younger LCA patients with better sight, says Joan Miller, a retina specialist at Harvard Medical School in Boston, not involved in either study.

But the success of both studies should buoy gene therapy's troubled past. "I think it could be a real turning point," Miller says.

Last year, a patient enrolled in a gene therapy trial to treat her rheumatoid arthritis died – although regulators say the therapy probably didn't cause the patient's death. And in 1999, 18-year-old Jesse Gelsinger died after receiving gene therapy to cure a rare metabolic disease.

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