Powerful language for educationally marginalised students

Helen Harper
Collaborators

- Bronwyn Parkin
- Maningrida College
- Cowandilla Primary School
- Primary English Teaching Association of Australia (PETAA) (funders)
The study

• Working title: *Scaffolding academic English in educationally marginalised contexts*

• Aims:
  – To articulate a robust, and reliable set of principles for scaffolding language and literacy
  – To investigate the impact of using these principles in maths and science classrooms
Outline

1. Context
2. Theoretical underpinnings
3. Teaching sequence for lunar eclipses
4. Student language
Context

Maningrida College (NT), 2 teachers
  – Mathematics:
    • Probability, Telling the time

Cowardilla Primary School (SA), 2 teachers
  – Science
    • Electric circuits, Lunar eclipses
The class at Cowandilla

- Year 7
- 2 teachers team teaching
- 42 students
- 73% EALD
- 92% attendance
- Culturally diverse
Theories

1. A language model (Halliday, Systemic Functional Linguistics)
2. Educational sociology (Bernstein)
3. Scaffolding (Bruner, Wood, Vygotsky)
Powerful language

• Powerful texts
• Powerful grammar
• Powerful vocabulary
By the end of Year 7, students describe techniques to separate pure substances from mixtures. The represent and predict the effects of unbalanced forces, including the Earth’s gravity, on motion. They explain how the relative positions of the Earth, sun and moon affect phenomena on Earth. [....] They communicate their ideas, methods and findings using scientific language and appropriate representations.
Types of pedagogy (Bernstein)

• ‘Subversive’:
  – Explicit, visible
  – Learning is a shared responsibility between teacher and student
  – Role of the teacher *changes*
Scaffolding begins with a social context
The universe is the name given to everything that exists. Space is the part of the universe which lies outside the Earth’s atmosphere. It includes galaxies, stars, planets and moons. The Earth’s galaxy is the Milky Way and within the Milky Way is our solar system. It consists of the sun at its centre, and the planets orbiting the sun.

Earth is one of the planets in the solar system. Like other planets, it has no energy of its own, but reflects the sun’s heat and light. It rotates on its axis, causing day and night as the sun shines on different parts of the Earth. As the Earth rotates, it orbits the sun, taking one year to complete one full orbit.

Orbiting the Earth is the moon. Like the Earth, the moon reflects the sun’s light. As the moon orbits the Earth, different amounts of light are seen, leading to different phases, with names like ‘full moon’ and ‘new moon.’ A full moon occurs when the earth is between the sun and the moon and the half of the moon that is facing the earth fully reflects the sun’s light. A new moon occurs when the moon is between the sun and the earth and the half that is facing the earth is in shadow.

A lunar eclipse occurs when the sun, the Earth and the moon are in direct alignment, and the Earth passes between the moon and the sun, blocking the sun’s rays and casting a shadow on the moon. This only happens at full moon.

A solar eclipse occurs when the sun, the moon, and the earth are in direct alignment, and the moon passes between the Earth and the sun blocking the sun’s rays, and casting a shadow on the earth. This only happens at new moon. Because the moon is smaller than the Earth, a solar eclipse is only visible from a very narrow track on the earth’s surface. Even though the moon is small, it can block out the sun because the sun is 400 times further from the Earth.

References:
DECD (2011): Year 7 Earth and Space Science Seasons and Eclipses Unit DRAFT
RIC Publications (2011): Australian Curriculum Science Year 7 Earth and Space Science
A lunar eclipse occurs when the sun, the earth and the moon are in direct alignment, and the earth passes between the moon and the sun, blocking the sun’s rays and casting a shadow on the moon. This only happens at full moon.
Purpose of focus text

1. Teachers become conscious of the focus language
2. Planning tool
3. Guides classroom dialogue
A lunar eclipse occurs when the sun, the Earth and moon are in direct alignment and the Earth passes between the moon and the sun blocking the sun’s rays and casting a shadow on the moon. This only happens at full moon.
A lunar eclipse occurs when the sun, the Earth and moon are in direct alignment and the Earth passes between the moon and the sun blocking the sun’s rays and casting a shadow on the moon.

This only happens at full moon.
## Lunar Eclipse: Text analysis

<table>
<thead>
<tr>
<th>Structure</th>
<th>Text</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phenomenon</td>
<td>A lunar eclipse occurs</td>
</tr>
<tr>
<td>Condition 1</td>
<td>when the sun, the Earth and moon are in direct alignment</td>
</tr>
<tr>
<td>Condition 2</td>
<td>and the Earth passes between the moon and the sun</td>
</tr>
<tr>
<td>Effect 1</td>
<td>blocking the sun’s rays</td>
</tr>
<tr>
<td>Effect 2</td>
<td>and casting a shadow on the moon.</td>
</tr>
<tr>
<td>Condition 3</td>
<td>This only happens at full moon.</td>
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</table>
Orienting activities
Earth, moon and sun.
27 Feb
Earth
- like other planets, no energy but reflects light and heat
- rotates on axis, causing day and night
- orbits the sun
  - 1 year = 1 full orbit

universe
space
outside Earth's atmosphere
- galaxies, stars
- planets, moon
- Earth's galaxy, Milky Way
- solar system
- Sun at centre, planets orbit Sun
Lunar eclipse

1. Direct alignment

2. The Earth passes between
   - Blocking the Sun's rays
   - Casting a shadow on the Moon

Happens at full moon
A **lunar eclipse** occurs when the sun, the earth and the moon are in **direct alignment**, and **the earth passes between** the moon and the sun, blocking the sun’s rays and casting a shadow on the moon. This only happens at full moon.

<table>
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<tbody>
<tr>
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Lunar Eclipse

A lunar eclipse occurs when the Sun, the Earth and the moon are in direct alignment and the Earth passes between the Sun and the moon.

1. Direct alignment
2. The Earth passes between the Sun and the moon.
Lunar Eclipse
A lunar eclipse occurs when the Sun, Earth, and the moon are in direct alignment.

1. Direct alignment
2. The Earth passes between the Sun and the moon.
Lunar Eclipse

A lunar eclipse occurs when the sun, the Earth, and the moon are in direct alignment and the Earth passes between the sun and the moon, blocking the sun’s rays and casting a shadow on the moon. This only happens twice a year at full moon.
Lunar eclipse

A lunar eclipse occurs when the Sun, Earth, and Moon are in line. The Earth casts a shadow on the Moon, which can only happen at full moon.

Condition 1: Approximately twice a year.
Condition 2: The Sun’s rays cast a shadow on the Moon.

Effect 1: The Moon passes between the Earth and the Sun.
Effect 2: The Earth passes between the Moon and the Sun.

Common Sense Commentary:
T: Eclipses have to do with earth and space science, space sciences, and we're going to be looking at the relative positions, or the positions of these three things... (points to diagram on the board). And the positions of those three things cause the seasons and cause eclipses.
**Low challenge ‘locating’ questions**

T: What are these three things on the image here? Caleb, do you know?

S: The earth, the sun and the moon.
Opening to all

T: Now does anyone know what this image is? Has anyone seen this one or this one before? Can anyone tell me what they are?
So here we had the Moon on the other side of the Earth from the sun and we could draw a line straight through them. Important thing to look at is the position. Sun, Earth, and Moon, what are these lines, sort of, here?

And there's different colouring here coming from the sun towards the Earth, what is that indicating?

Uh, and the Earth's creating a shadow over the Moon?

Absolutely. This part just in here-- see that sunlight that's shining here? Then it hits the Earth and then they've still got these lines and the different colouring here. And you're absolutely right, it's indicating that on the other side of the Earth or the half of the Earth that's facing the Moon and not facing the sun, that is in darkness because it's night-time, and the, the Earth casts a shadow onto the Moon. So the Moon's light is being blocked by the Earth, isn't it?
As meaning and language begin to be shared
What are the three major things that we are talking about that are going to help us describe lunar eclipses? I think you can tell me. What are the three?

Sun, Moon, and Earth, absolutely, those are the three key ones. Um, so yesterday we were talking about--actually, can you refresh my memory? There's something around the room that could help you, ah, remember what we were having a look at yesterday. (Teacher stares at the poster.) Meena?

Moon phases?

So the Moon phases, absolutely.
T: So the Moon phases, absolutely. Who can tell me something more about the Moon phases? That's exactly what we were looking at, give me some information about them.

S: We were looking at how they occur.

T: So you said, "We look at how they occur." Can you give me any more information about how they do occur?

S: Like, a new Moon occurs when the Moon is between the Earth and the sun.
Independent explanation
How a lunar eclipse occurs:

A lunar eclipse occurs when the sun, the earth and the moon are in direct alignment and the earth passes between the moon and the sun, blocking the sun’s rays and casting a shadow on the moon. This only happens at full moon approximately twice a year.

Why a lunar eclipse doesn’t happen every month:

Because the tilt of the orbital line for the earth doesn’t always tilt the way that it makes direct alignment, so it tilts every time and when the end is up to the moon and it’s in direct alignment, that’s how a lunar eclipse occurs.
• Gradual shift from oral to written, from concrete to abstract

• The focus text links activities together

• Requires a high degree of consciousness by the teacher

• Is efficient
Pedagogic shuffle

“It’s a bit like a 3D printer: you keep going back and forth and each turn adds a new bit of meaning, so the shape eventually becomes apparent.”
Thanks to:

- Dr Bronwyn Parkin, University of Adelaide
- Cowandilla Primary School:
  - Louise Walker (teacher)
  - Michael Cannavan (teacher)
  - Julie Hayes (principal)

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