The Transition to Computer-based Assessment in PIRLS

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Overview

• Introduction to PIRLS
• PIRLS 2016: introducing ePIRLS
• Comprehension processes in PIRLS and ePIRLS items
• Results in PIRLS and ePIRLS
• New directions for (e)PIRLS analysis
• PIRLS 2021: the transition to all-digital assessment
• Digital literacy in PIRLS/ePIRLS: possible implications for national curricula
Introduction to PIRLS (1)

- Progress in International Reading Literacy Study
  - Assesses the reading literacy of children at Fourth grade
  - Also collects background information from students, parents/guardians, teachers, and principals
  - 5-year cycle: 2001; 2006; 2011; 2016; 2021
  - 50 countries participated in 2016; number likely to rise
Introduction to PIRLS (2)

- PIRLS definition of reading literacy:
  - 2001:
    the ability to understand and use those written language forms required by society and/or valued by the individual. Young readers can construct meaning from a variety of texts. They read to learn, to participate in communities of readers, and for enjoyment. (Campbell, Kelly, Mullis, Martin & Sainsbury, 2001)
  
  - 2016/2021:
    the ability to understand and use those written language forms required by society and/or valued by the individual. Readers can construct meaning from texts in a variety of forms. They read to learn, to participate in communities of readers in school and everyday life, and for enjoyment. (Mullis, Martin & Sainsbury, 2015; Mullis & Martin, 2019)
Introduction to PIRLS (3)

- Purposes for reading
  - Reading for *literary experience* (‘Literary’)
  - Reading to *acquire and use information* (‘Informational’)

- Processes of comprehension
  - *Focus on and retrieve* explicitly stated information (‘Retrieve’)
  - *Make straightforward inferences* (‘Infer’)
  - *Interpret and integrate* ideas and information (‘Interpret’)
  - *Evaluate and critique* content and textual elements (‘Evaluate’)

PIRLS 2016: introducing ePIRLS

- An optional extension of PIRLS: an assessment of digital literacy, administered to the same sample of students that took paper PIRLS (but on a different day)
- Simulated Internet environment
  - Each ePIRLS task presented as a research project on a particular topic
  - Network of hyperlinked ‘websites’, including multimodal, interactive features
  - Teacher avatar – guides children through the task. (Not really possible to get lost!)
- ePIRLS items classified using same system as PIRLS
ePIRLS in the study framework (1)

- A successful reader on the Internet (i.e. one who is digitally literate): ‘one that can meet his or her reading goals by efficiently finding and comprehending the target information’ (Mullis & Martin, 2015, p. 22)

- In digital environment, as opposed to paper one...
  - More information.
  - Information presented in a wider variety of ways (including multimodal, dynamic elements).
  - Readers must infer the probable usefulness/relevance of sites yet unseen.
‘Retrieve’:
- Digital environment may require initial macro-processing.

‘Infer’:
- Online inferencing begins with predictive inferencing of potential relevance of sites.

‘Interpret’:
- When reading digitally, readers must synthesize and integrate information from across a range of sites.

‘Evaluate’:
- Digital reading may require an evaluation of the credibility of the information source, and/or a critique of the site format(s).
Comprehension processes in PIRLS and ePIRLS items

- Examples on the next slides are drawn from released texts from 2016, used with permission from the IEA.

What does it take to get to Mars?

First, you need a very powerful rocket.

Second, you need to plan a long time ahead.

Earth and Mars both move around the Sun, but they have different orbits. As a result, sometimes the two planets are closer together and sometimes the planets are farther apart. So, to get to Mars, you need to calculate Mars’ orbit. Then, you must aim for where Mars will be when your rocket gets there. It will take your rocket about eight months to get to Mars.
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ePIRLS (Mars 1) – Infer

Google search results:

1. Mars Solar Energy Solutions
   www.mars-solar-energy-solutions.com
   Providing solar hot water, solar pool, solar electric installations and service. Solar system panels provide...

2. Planet Discovered Outside Solar System
   www.times-journal.org > science > astronomy
   Astronomers have spotted a planet, more red than Mars, orbiting a dying star outside of our solar system.

3. An Overview of the Solar System
   www.eightplanets.org
   The solar system consists of the Sun and the eight official planets: Mercury, Venus, Earth, Mars, Jupiter...

4. Solar Eclipses for Beginners
   www.mraclepse.com
   Learn where the next solar eclipse will occur. View images of solar eclipses on Earth and Mars...

Class Project:

1. Look at the Google search results, at left.

   Mr. Webster
   Today, we are going to read about the exploration of Mars.

   Mr. Webster
   Let's begin by using "Google" to search the Internet.

   Student
   Click on the link that is most likely to explain where the planet Mars is in the solar system.
Over the years, scientists have sent three types of missions to Mars.

**Flybys**
The first missions simply flew past Mars. They took as many pictures as possible as they went by.

**Orbiters**
By the year 2000, countries were able to put spacecraft into orbit around Mars. Long-term studies were now possible. Today, several spacecraft are still orbiting Mars.

**Rovers**
In recent years, scientists thought of ways to put rovers on Mars. A rover is a remote-controlled vehicle with six wheels. It is the size of a small car. It can travel around and explore the surface of Mars.
INTRODUCTION TO MARS

The Red Planet

For hundreds of years, scientists have been interested in Mars. Because it is a planet next to Earth, perhaps it also has life? At first, scientists could only study Mars through telescopes. They could see that Mars looked red. They found out that Mars is about half the size of Earth. Interestingly, until about 100 years ago, scientists thought that Mars had man-made canals. Because all living things on Earth need water, scientists thought there might be life on Mars!

As technology improved, we learned more about Mars. Now we know that Mars’ color comes from reddish iron oxide on its surface. We learned that it is like a desert—very rocky and dusty. Also, Mars is farther away from the Sun than Earth, so it is much colder. In the winter, the temperature on Mars is about minus 100 degrees Celsius.

14. New inventions have helped scientists look at Mars from locations closer and closer to the planet. In the boxes below each location, write the name of the invention that scientists used to look at Mars. You can look back at the webpages.

Looking at Mars from Earth

Looking at Mars from space

Looking at Mars from its surface
What does it take to get to Mars?

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Earth and Mars both move around the Sun; but they have different orbits. As a result, sometimes the two planets are closer together and sometimes the planets are farther apart. So, to get to Mars, you need to calculate Mars' orbit. Then, you must aim for where Mars will be when your rocket gets there. It will take your rocket about eight months to get to Mars.
ePIRLS (Mars 10) - Evaluate

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10. Look at the moving diagram of Earth and Mars orbiting around the Sun. What is the main purpose of the diagram?

- to show that Earth and Mars are far from the Sun
- to show that the Sun is part of the solar system
- to show that the distance between Earth and Mars changes
- to show the colors of Earth and Mars
ePIRLS results were reported on the PIRLS achievement scale, to facilitate comparison.

- Made possible because the same children took both assessments
- Only children who took both included in ePIRLS data
- Potentially useful to compare ePIRLS results with PIRLS Informational results, as well as with overall PIRLS results.
Results in PIRLS and ePIRLS 2016 (2)

New directions for (e)PIRLS analysis

- A few examples only!
- Exploring...
  - the characteristics associated with achievement on paper vs digital reading tests.
  - pupils’ self-efficacy as regards computer usage and their performance on ePIRLS.
  - the potential of process data to help us understand children’s navigation (and comprehension?) strategies.
Characteristics associated with achievement

- Example from Ireland:

- Multilevel models of variables associated with achievement in paper PIRLS and ePIRLS.

- Broad similarities, BUT also some differences:
  - Owning a smartphone: negative association, PIRLS only
  - Time spent browsing the Internet: positive effect, ePIRLS only
  - Frequency of using a computer at school for schoolwork: negative association in ePIRLS (!), none in PIRLS.
Highest-scoring 7 countries: self-efficacy for computer use

Boys
- Low: 7.6
- Medium: 38.9
- High: 53.6

Girls
- Low: 9.1
- Medium: 47.5
- High: 43.3

Percentage of boys: 7.6, 38.9, 53.6
Percentage of girls: 9.1, 47.5, 43.3
Mean ePIRLS score: 533.1, 558.8, 564.1, 543.8, 570.5, 575.6
Denmark: self-efficacy for computer use

Boys

- Low: 3.5%
- Medium: 30.0%
- High: 66.4%

Girls

- Low: 7.2%
- Medium: 48.3%
- High: 44.5%

Mean ePIRLS score

- Low: 529.3
- Medium: 550.4
- High: 563.1

Mean ePIRLS score for girls:

- Low: 522.4
- Medium: 557.3
- High: 572.9
Ireland: self-efficacy for computer use

[Graph showing the percentage of boys and girls in Low, Medium, and High self-efficacy groups.]

- **Boys**: 6.5% Low, 39.2% Medium, 54.3% High
- **Girls**: 5.5% Low, 39.6% Medium, 54.9% High

[Line graph showing mean ePIRLS scores for boys and girls in Low, Medium, and High self-efficacy groups.]
Integrating information across web pages

A LADY DOCTOR?
You Must Be Joking!
Doctor Elizabeth Blackwell

Practicing

Within a few years of Elizabeth leaving college, more than 20 women throughout the country were studying in medical schools, including Elizabeth’s younger sister, Emily. America, however, was still not ready for a “lady doctor.” No hospital in America would hire Elizabeth, so she travelled to France to work in a hospital there. Elizabeth worked hard and started studying to become a surgeon. However, she became ill and lost sight in one eye and had to give up her dream of becoming a surgeon. Despite this, she kept working hard as a general doctor.
PIRLS 2021: the transition to all-digital assessment

- Options for countries:
  - Administer PIRLS on computer, with ePIRLS integrated into the test
  - Administer PIRLS on paper – no ePIRLS
- Currently, seems likely that about half the countries will select each option
- Mode effect study built in: countries taking the test on computer must also administer trend passages on paper to a smaller sample (during the main study)
- Aim: that the passages and items presented in both paper PIRLS and digital PIRLS will be as equivalent as possible across modes
Digital literacy in PIRLS and ePIRLS: implications for national curricula?

- Importance of ‘predictive inferencing’
- Complex navigation skills
- Multimodal and/or interactive text features

- Bearing in mind the unavoidable artifice of the test environment...
References


