

Developing a Framework for Assessing Environmental Literacy

December 1, 2011
at National Press Club in Washington, D.C.



What an assessment framework

is...

- guidance for people creating an assessment (i.e., test items & survey questions)
- components & contexts to be assessed, based on research
- specifications re: the % and types of items for each component

is not...

- a test or specific questions that should be asked
- standards or guidelines for what should be in a curriculum
- teaching strategies

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Our 3 Products

- ▶ **Definition of Environmental Literacy**
- ▶ **Components of Environmental Literacy**
- ▶ **A Proposed Framework for Assessing Environmental Literacy in PISA 2015**

Definition

An environmentally literate person is someone who, both individually and collectively with others, makes informed decisions concerning the environment, is willing to act on these decisions..., and participates in civic life. Those who are environmentally literate possess, to varying degrees:

- ▶ knowledge and understanding of environmental concepts... and issues;
- ▶ a set of cognitive and affective dispositions;
- ▶ a set of cognitive skills and abilities; and
- ▶ the appropriate behavioral strategies ...to make sound and effective decisions

Components of Environmental Literacy

- ▶ **Competencies**
- ▶ **Knowledge**
- ▶ **Dispositions**
- ▶ **Behavior**

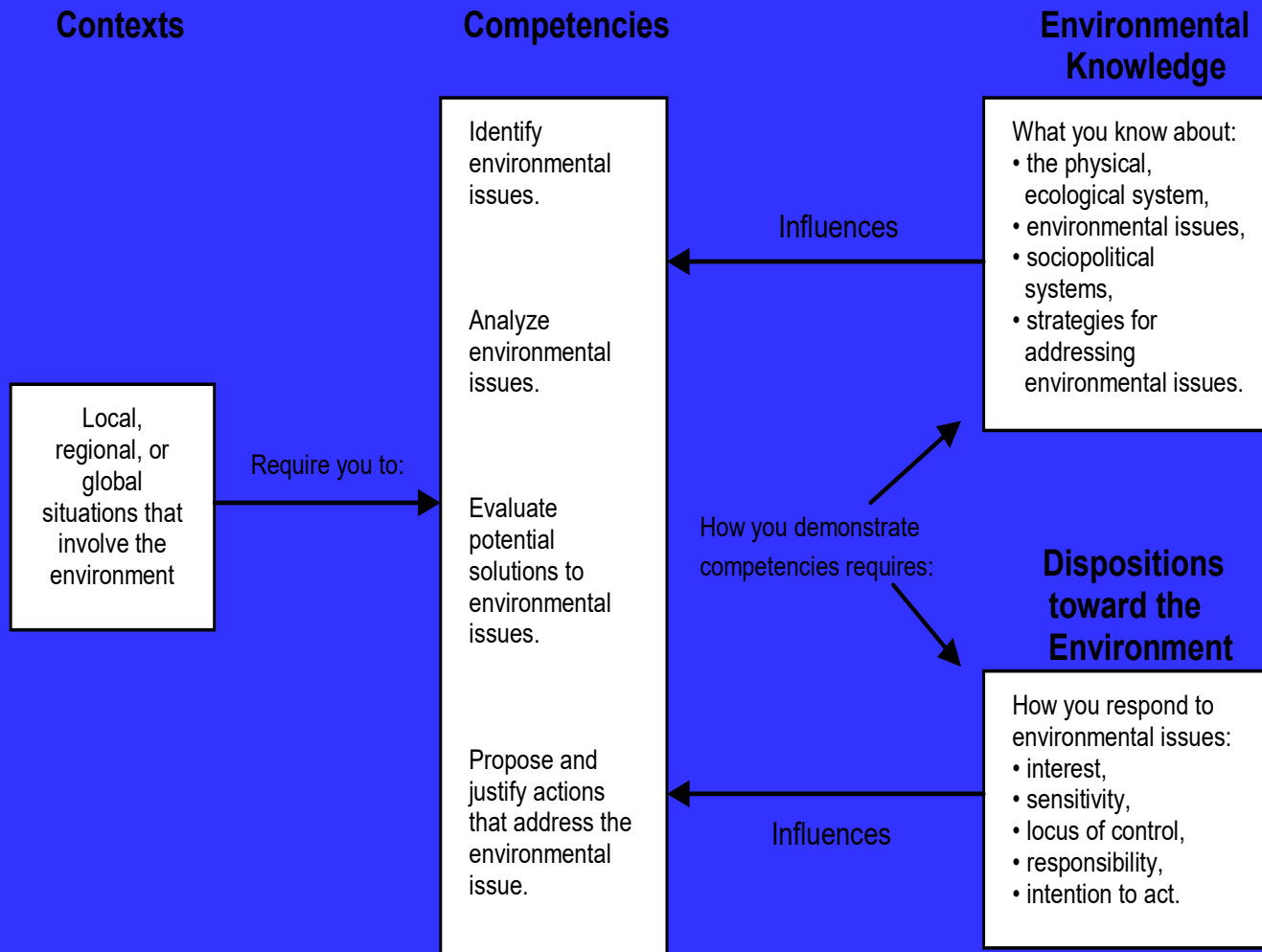
Competencies

- ▶ Identify environmental issues,
- ▶ Ask relevant questions,
- ▶ Analyze environmental issues,
- ▶ Investigate environmental issues,
- ▶ Evaluate and make personal judgments about environmental issues,
- ▶ Use evidence and knowledge to defend positions and resolve issues, and
- ▶ Create and evaluate plans to resolve environmental issues.

Components of Environmental Literacy

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- ▶ **Knowledge**
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- ▶ **Behavior**

A proposed framework for assessing environmental literacy – PISA 2015



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OECD Programme for International Student Assessment (PISA)

Environmental Literacy in PISA

Washington, 1 December 2011

Rodger Bybee
Chair of Environmental Literacy Expert Group
PISA 2015

Overview

r Know why you are looking

- The case for shaping **tomorrow's** political economy of environmental issues **today**
- Need for a comparative dimension (the yardstick for educational success is no longer just improvement by national standards but the best performing systems internationally)

r Know what you are looking for

- Dimensions of a framework for assessing environmental literacy

r Know how you recognise it when you found it

- Issues around validity
- Some lessons from PISA .

PISA in brief

PISA countries in 2009

- r **In 2009 over half a million students...**
 - representing 28 million 15-year-olds in 74* countries/economies
- ... **took an internationally agreed 2-hour test...**
 - Goes beyond testing whether students can reproduce what they were taught...
 - ... to assess students' capacity to extrapolate from what they know and creatively apply their knowledge in novel situations
- ... **and responded to questions on...**
 - their personal background, their schools and their engagement with learning and school
- r **Parents, principals and system leaders provided data on...**
 - school policies, practices, resources and institutional factors that help explain performance differences .

* Data for Costa Rica, Georgia, India, Malaysia, Malta, Mauritius, Venezuela and Vietnam will be published in December 2011

In 2006 PISA defined environmental science performance in terms of a student's:

- Scientific knowledge and *use/extrapolation* of that knowledge to...
 - ... identify scientific issues,
 - ... explain biological and geoscience phenomena related to the environment, and
 - ... draw evidence-based conclusions about the environment
- Understanding of the characteristic features of environmental science as a form of human knowledge and enquiry
- Awareness of how environmental science can shape our use of earth's resources, policies about environmental sustainability, and future responsibility towards environmental quality?
- Willingness to engage with environmental science

For example
When reading about global warming, can students separate scientific-related from non-scientific aspects of the text ?

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For example
Do students know the difference between evidence-based explanations and personal opinions about the environment?

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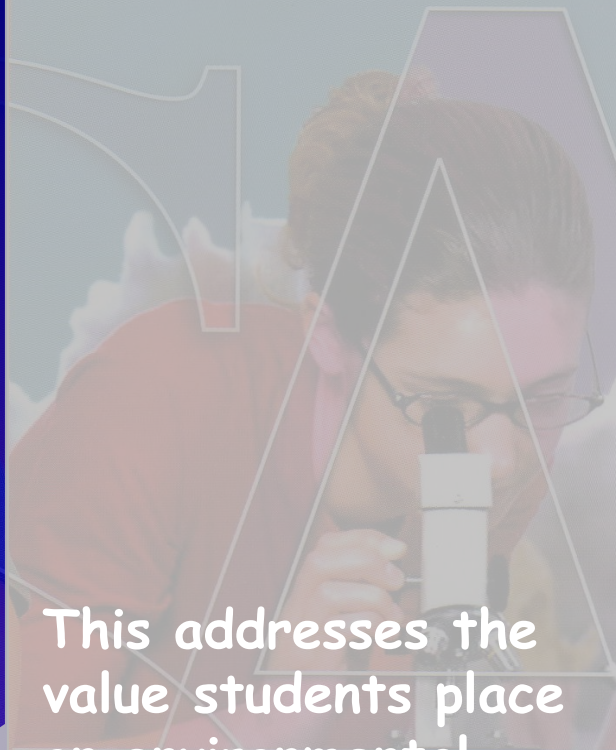
A student with glasses is looking through a microscope. The image is overlaid with a large, semi-transparent white number '1'.

For example

Are students aware of environmental changes and the effects of those changes on economic and social stability?

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A student with glasses is looking through a microscope. The image is overlaid with a large, semi-transparent number '1' and a large, semi-transparent letter 'A'.

This addresses the value students place on environmental science, both in terms of topics and in terms of the scientific approach to understanding environmental issues

Why schools are so important

Main sources of knowledge on environmental issues (OECD average)

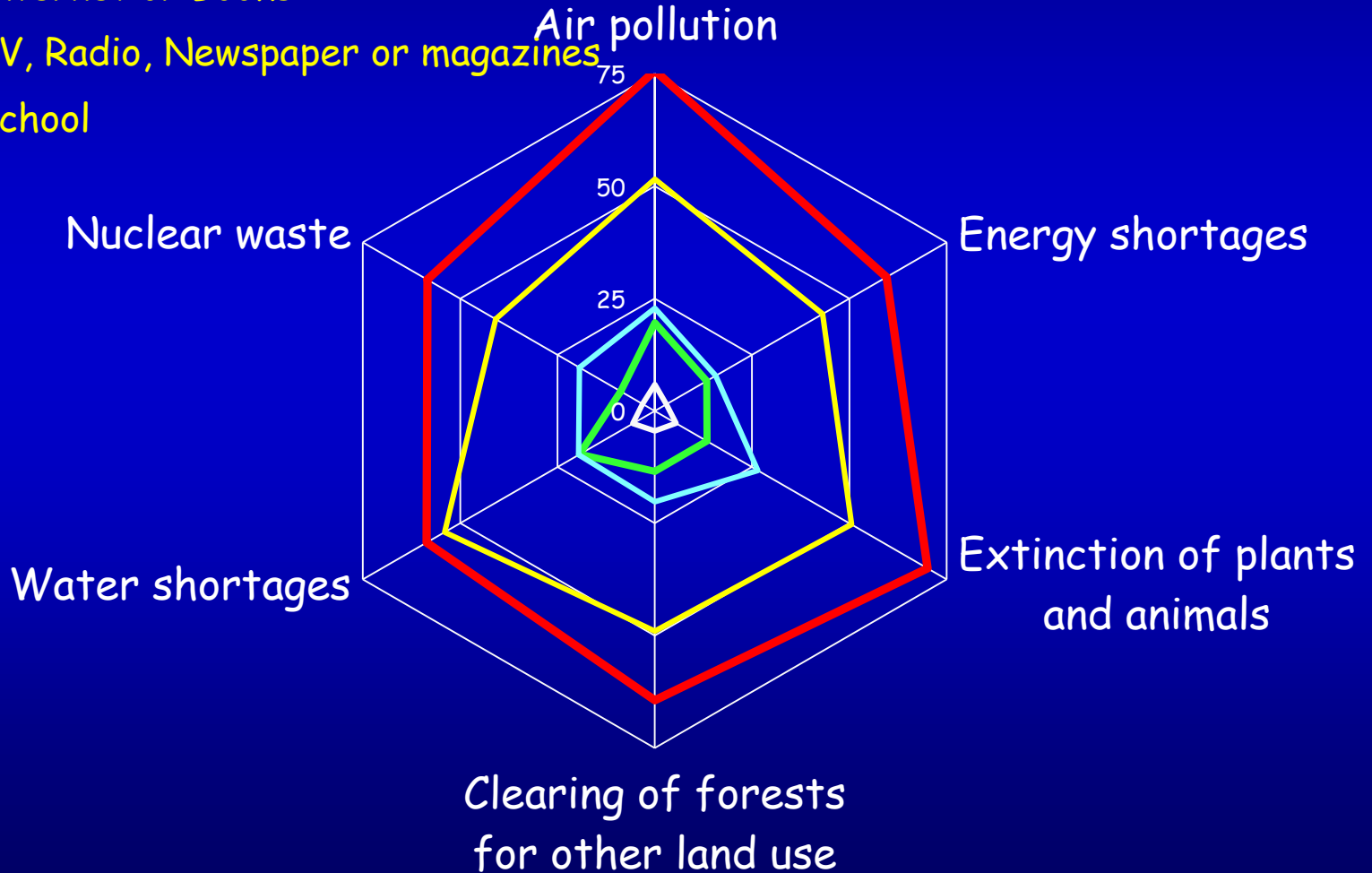
— Friends

— Family

— Internet or Books

— TV, Radio, Newspaper or magazines

— School



Some conclusions from PISA 2006

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r **Most students are engaged, but performance in environmental science varies widely both within and across countries**

- On average, 20% of students can tackle the most difficult environment related science questions in PISA, but 16% cannot cope with the most basic environment-related science questions

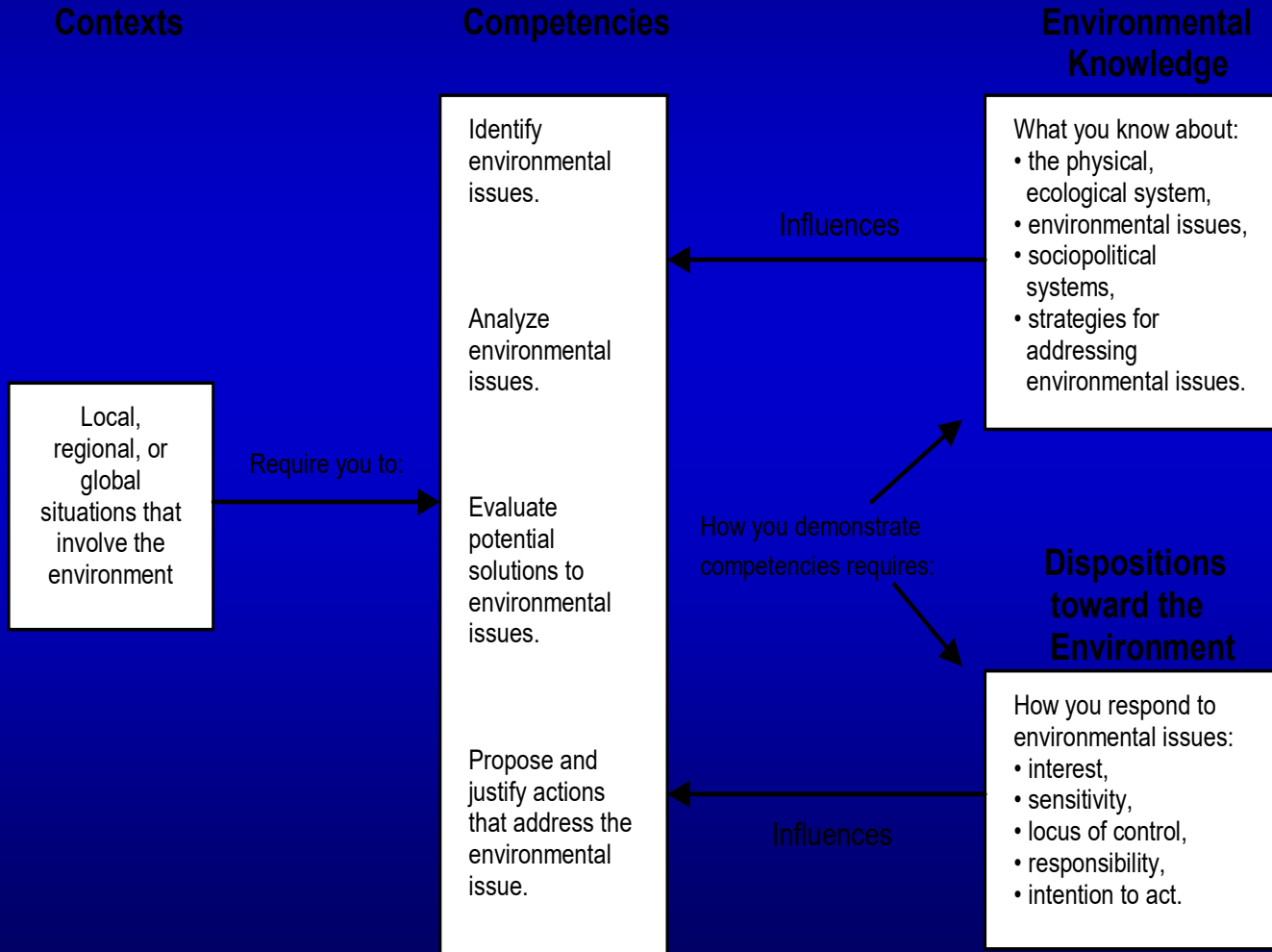
r **In most countries, most 15-year-olds are familiar with environmental issues...**

- ... but those who have not mastered the science of it do not have a realistic appreciation of the dimension of the challenges
- Students who have mastered the science of the environment are also better informed about complex environmental issues

r **Schools are the central player, because most students learn about the environment at school**

- Schools and the media complement each other
- The alignment between the attitudes of students and parents suggests that educating students may have an impact beyond their own attitudes towards the environment .

A proposed framework for assessing environmental literacy – PISA 2015



Promises of the NAAEE initiative

r A strengthened conceptual basis

- A coherent framework
- Integration of behavioural aspects, mobilisation of cognitive and non-cognitive resources
- Dynamic and collaborative aspects
- Multiple components of knowledge

r Practical guidance

- Guidance for evaluating the many decisions that must be made in the design of a PISA assessment

r A contribution to a global consensus around the PISA assessment

- An international option in 2015 .

- www.oecd.org; www.pisa.oecd.org
 - All national and international publications
 - The complete micro-level database
- email: pisa@oecd.org

- Andreas.Schleicher@OECD.org

Thank you !

... and remember:

Without data, you are just another person with an opinion

Assessment of Environmental Literacy: Challenges and Opportunities



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OF EDUCATIONAL ASSESSMENT**

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Critical 21st Century Skills and Knowledge

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- Many talk about 21st Century skills in vague terms, but environmental literacy provides a vehicle for teaching and assessing these important knowledge and skills
 - Critical and flexible thinking
 - Persistence
 - Creativity
 - Multi-disciplinary knowledge and skills
 - Collaboration
 - Analysis and evaluation



A complex domain

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- The proposed framework provides a useful foundation for organizing a very complex domain:
 - Competencies
 - Knowledge
 - Disposition
- All within the context of important topics and environmental issues
- This complexity makes this an exciting area to teach and assess, but also leads to challenges for both



Assessment challenges

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- The framework is a powerful depiction of environmental literacy and this framework will serve as an important foundation for both instruction and assessment
- The integrative nature of the framework is one of the things that makes it rich, but also creates significant challenges for validly representing this domain on a large-scale assessment



The risk of narrowing

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- We have considerable evidence that very rich domains often get narrowed and reduced to easily measured knowledge and skills when assessed on a large-scale test
- The creators of this framework need to carefully guard against such narrowing



A Comprehensive Approach

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- If environmental literacy is only assessed on international and other large-scale assessments, we've lost the battle
- The goal of producing such a framework is to help advocate for the teaching and learning of environmental literacy in U.S. and international classrooms
- Therefore, we need to be thinking about a comprehensive assessment framework that describes how environmental literacy can be assessed at various levels of the educational systems



A Comprehensive Assessment System

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- A comprehensive assessment could allow for a much richer assessment of the full framework by allowing for such methods as projects, portfolios, demonstrations, etc at the local level
- For an assessment system to be comprehensive, there should a coherent articulation among the various levels of the system
- This means that the large-scale assessment must faithfully represent the domain (e.g., not only low cognitive level questions) so that the coherence among the levels is apparent



Next steps

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- Consider a principled design approach such as Evidence Centered Design (ECD, Mislevy, 2004) to serve as a foundation for design:
 - Student model
 - Evidence model
 - Task model
- Translate the assessment framework into assessment specifications
 - The framework starts this, but much more detail about the nature and structure of the assessment tasks, the target domain, the proposed claims (about what students know and can do), etc is necessary to properly design the assessments



Last words

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- Thanks to NAAEE and PISA for taking this important and bold step
- While some critics say that we never fatten the cow just by weighing it, many others know that gathering data about critical knowledge gaps can spur important action
- There is no question that action is desperately needed in environmental literacy!

