

Primary Science Education: Developing Scientific Literacy for Global Goals

Dr. Cliona Murphy,
Associate Professor in Science Education, Dublin City University
Chair, ALLEA's Working Group Science Education

The Joy of science





Primary science education has a significant role to play

- Science Knowledge and skills
- Embedding Values
- Habits of mind
- 21st Century skills



WORLD SCIENCE FORUM
BUDAPEST



Scientific Literacy

The ability to

Engage with science-related issues and with the ideas of science as a reflective citizen

Be willing to engage in reasoned discourse about science and technology, which involves competencies in three main areas:

Explaining phenomena scientifically

Evaluating and designing scientific inquiry

Interpreting data and evidence scientifically

This definition emphasizes the functional application of scientific knowledge to solve real-world problems, understand scientific phenomena, and make informed decisions as a citizen

OECD, 2023





ic Literacy

– an example



A closer look at some of the obstacles

Science Curricula

Primary teachers

Limited knowledge

Lack of confidence

Insufficient professional learning opportunities



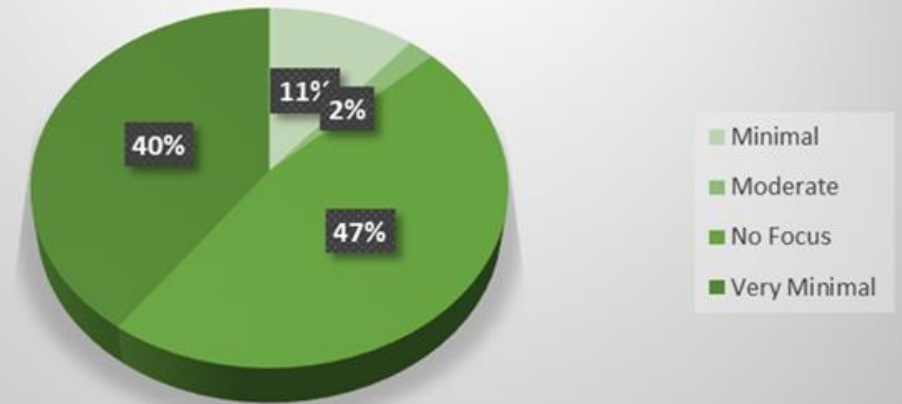
Primary Science Curricula

- Scientific Literacy
 - Lack of clear definitions
 - Lack of learning outcomes related to scientific literacy
 - Lack of examples
 - Missed opportunity
- Lack of learning outcomes explicitly relate to climate change / sustainability

(Murphy et al 2023: UNESCO 2021)



Percentage of documents by extent of CC focus



Primary Teachers' Knowledge & Confidence

Knowledge

- Limited understanding of science underpinning sustainability and climate challenges
- Poor science pedagogical knowledge
- Insufficient professional learning opportunities
- Therefore difficult to effectively support students' learning

(ALLEA, 2020; Mallon 2015; Murphy et al., 2023)

Confidence

< 40% were confident to teach about CC

33% confident could effectively explain effects of CC on their region / locality

25% felt they could effectively explain how to take action

55% had received 'training' either pre-service or in-service



UNESCO 2021

Moving Forward

*“Teachers are among
the many messengers
of knowledge ... the
trusted by the youth”*
Corner et al 2015

High Quality Professional Learning for primary teachers

- Understanding of science content underpinning global challenges
- Pedagogical Content Knowledge (PCK)
- Avoid ‘one size fits all’ type models
- Context based

Introduce teachers to high quality education resources

- Effective teaching pedagogies
- Align with curricula
- Opportunities to ‘do’ the inquiries

National Curricula

- Explicit learning outcomes
- Scientific literacy
- Sustainability and Climate Change

Assessment

- Knowledge, skills, values, action
- State exams

Research

- Impact on teaching and learning

