



Primary Science and Creativity: Strange Bedfellows?



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What is creativity?

- Sectoral – creativity in particular sectors
- Elite – creativity in particular ‘exceptional’ people
- Democratic – the ability for creativity in all sectors and by all people

‘A policy for creativity in education needs to be about everybody, not just a few’ Sir Ken Robinson

Key elements of creativity

Using
imagination

Pursuing with
purpose



Generative
thinking

Analytical
thinking

Being original

Judging value

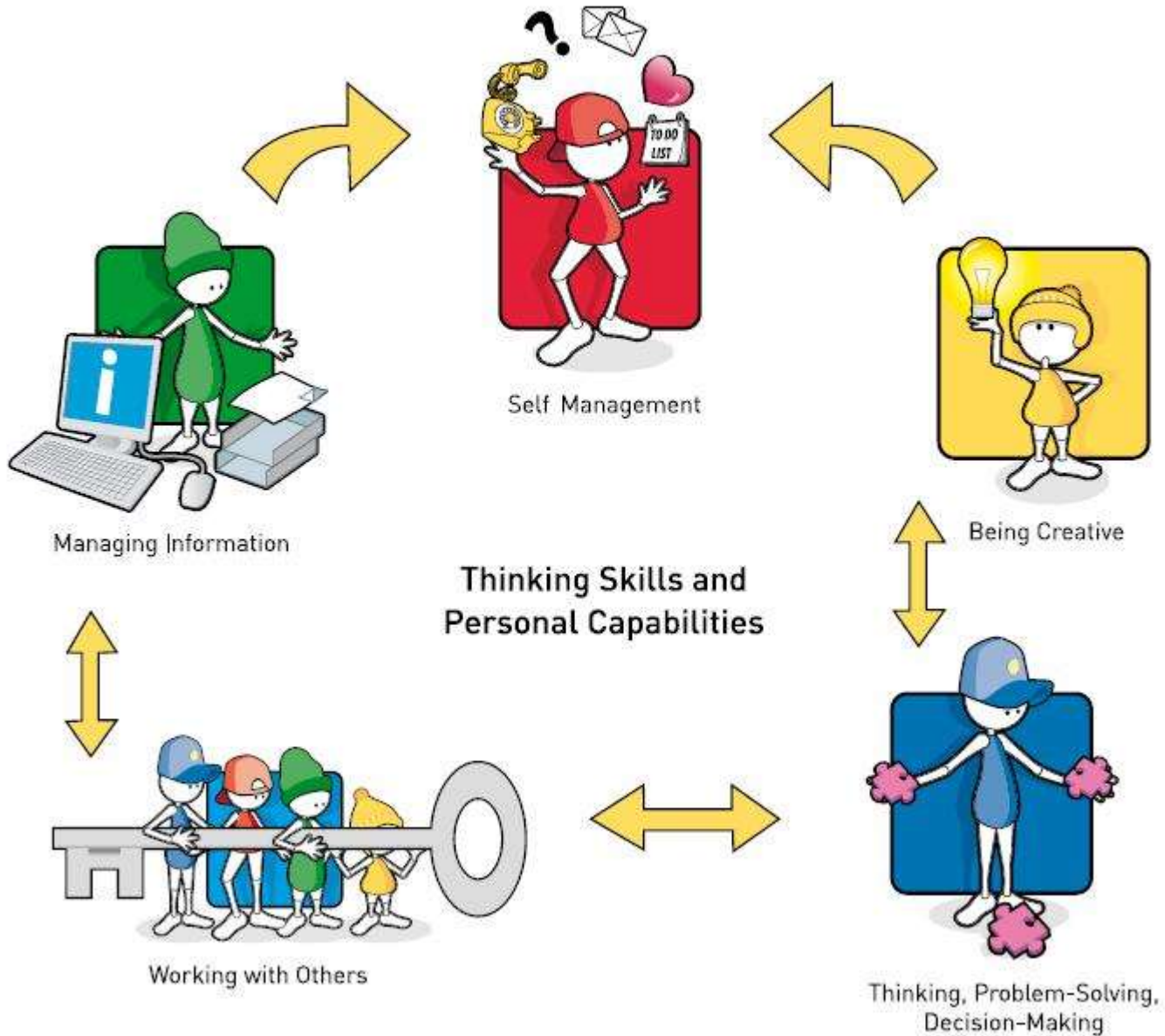




One of 6 Key Skills in the new Junior Cycle Curriculum in Ireland

BEING CREATIVE

Thinking Skills and Personal Capabilities Framework



What about Primary Science?

- In the Northern Ireland Curriculum ‘The world around us – science and technology’, there is explicit guidance around being creative through curiosity, exploration, flexibility and resilience (CCEA 2007).
- **Children are expected to be creative in science.**

Table 1: The instances of 'creat-' words in the Science and Visual Arts Primary Curricula (DES/NCCA 1999)

	Creativity	Creative(ly)	Create(s)(d)	Creation	Creating	Creature(s)
Science	0	4*	7	3	2	0
Visual Arts	4	11	60	1	24	5

*2 of these instances relate to the designing and making content of the curriculum

Why creativity in science? Why now?

21st Century children are global citizens, with responsibilities to each other and the Earth.

Opportunities

- Technology
- Communications
- Health and well-being
- Globalised world
- ...

Uncertain and challenging future

- Climate change
- Diminishing natural resources
 - Access to clean water
 - Access to food
- Energy crisis
- Access to healthcare
-

CREATIVITY
A 21ST CENTURY SKILL

'We're going to need every ounce of ingenuity, imagination, and creativity to confront these problems'. Sir Ken Robinson

So what opportunities are there for creativity in primary science?

- *'Investigations and problem-solving tasks nurture the inventive and creative capacities of children'* (DES/NCCA 1999 p. 6)
- Furthermore, one of the core aims is to *'foster the child's natural curiosity, so encouraging independent enquiry and creative action'* (p. 11).
- This suggests a strong link between creativity and investigations and enquiry.
- Working scientifically is at the heart of primary science curricula.

Working scientifically skills developed across all stages of the primary curriculum mapped to being creative.

Working scientifically	Being creative learning outcomes (NCCA 2013)
Questioning	Imagine different scenarios
Observing	Seek out different viewpoints and perspectives
Predicting	Predict different outcomes
Investigating and experimenting	Think through a problem step-by-step, test out ideas, try out different approaches when working on a task, take risks and learn from mistakes and failures
Estimating and measuring	Repeat the whole exercise in necessary
Analysing	Evaluate different ideas, evaluate what works best
Recording and communicating	Express my ideas through movement, writing, music, art, story-telling and drama

Importance of collaboration in creativity

- Collaboration, diversity, the exchange of ideas, and building on other people's achievements are at the heart of the creative process.
- Children need to have opportunities to share ideas, work collaboratively together, build on existing ideas and to follow their own ideas in science to allow for creativity to flourish.

'The great scientific breakthroughs have almost always come through some form of fierce collaboration among people with common interests but with very different ways of thinking'. Sir Ken Robinson

Creative approaches to primary science

- Inquiry-based science education
 - Strongly advocated as an effective approach
 - Such inquiry-based science experiences need to be carefully planned to ensure that these are child led rather than teacher led and allow for real collaboration and exploration.
 - They also need to be purposeful so that children can judge and evaluate the process, outcome, solution or product.

Creative approaches to primary science

- Cross-disciplinary approaches
 - Using drama in science
 - For example, using techniques such as freeze-frame and conscience alley to explore habitats and food chains in the Disney movie Finding Nemo (See Kelly 2012). This can lead on to controversial issues such as over fishing and whaling.
 - Integrating science with visual arts
 - For example, using pencil drawings with focus on line, colour, texture can lead to scientific observations. Such observations have the potential to lead to questions which may then open the path to a child-led investigation.

But what about assessment?

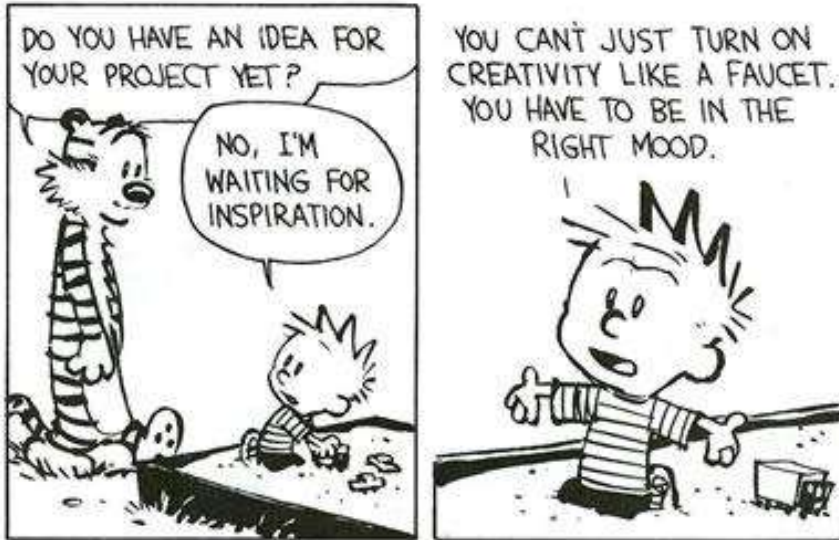
The National Council for Curriculum and Assessment (NCCA) advocates the following approaches to assessment in the primary school:

- Self-assessment
 - Conferencing
 - Portfolio assessment
 - Concept mapping
 - Questioning
 - Teacher observation
- Inquiry-based approaches along with collaborative learning offer scope for teacher observation and conferencing.
 - Equally when children are engaged in inquiry and other creative endeavors teachers can question children for both formative and summative purposes.
 - Through concept-mapping children can make sense of their own ideas.

Opportunities and challenges?

- In a period of welcome curriculum reform and consultation, it is essential that creativity is seen as a skill which is encouraged and developed across all areas of the curriculum and at all levels.
- [Primary Curriculum: New Pathways for Teachers and Children](#) (NCCA 2014)
- It is acknowledged that initial teacher education needs to respond to such changes.
- Equally continuing professional development courses are needed to develop teachers' confidence in such approaches and methods. This has been an issue when implementing inquiry-based approaches in Ireland and more widely

Primary Science and Creativity

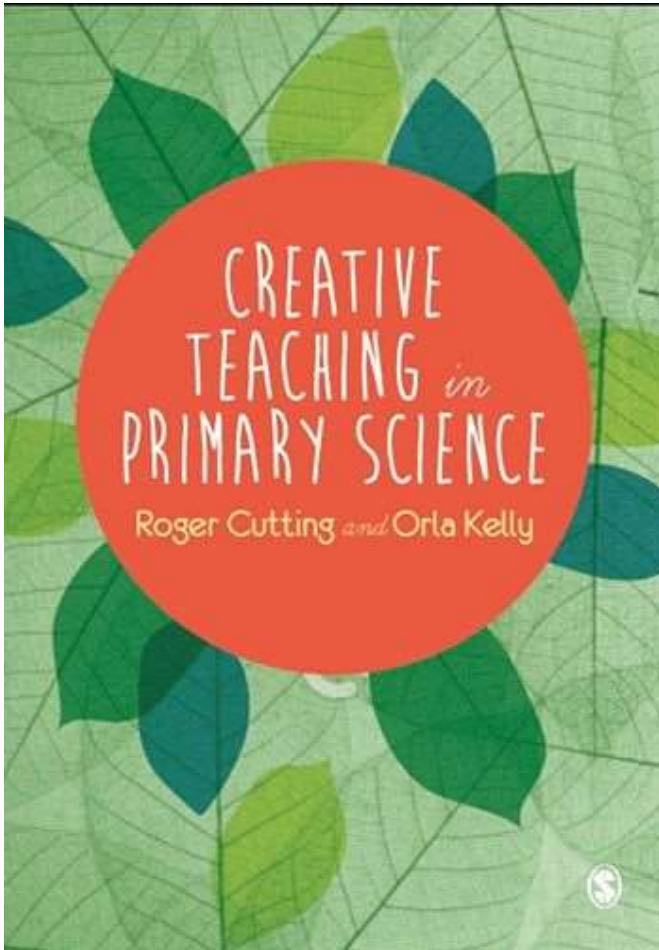


So while we can't just turn on creativity, we can plan for and adopt approaches to encourage creativity in primary science...

And remember in the words of Albert Einstein...

Creativity is contagious, pass it on!

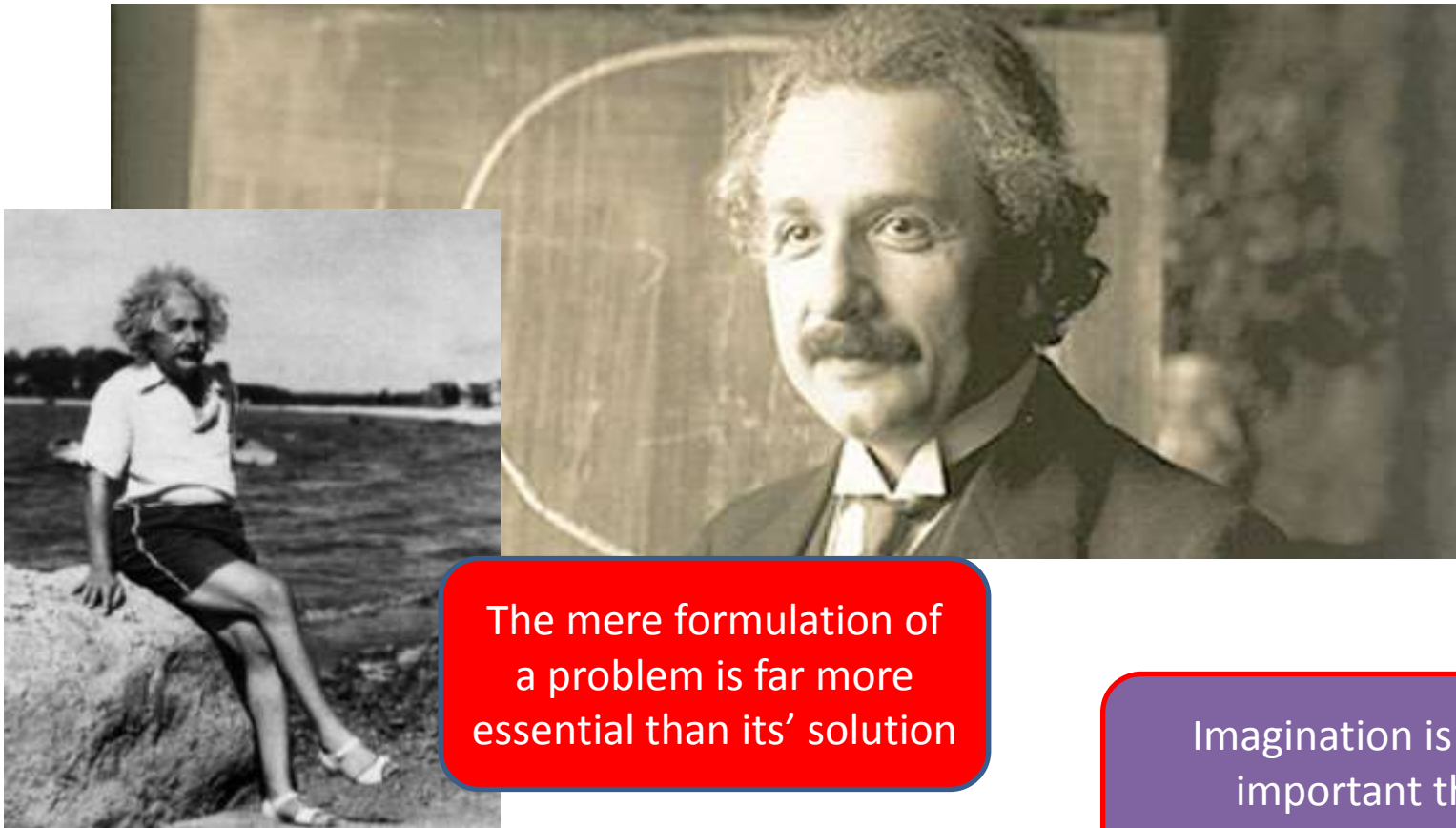
Thank you for listening



Questions?

A person who never made a mistake never tried anything new.

I have no special talent. I am only passionately curious.



The mere formulation of a problem is far more essential than its' solution

Imagination is more important than knowledge.