Putting creative thinking at the heart of schools - what creativity is, how to cultivate it and how to assess it
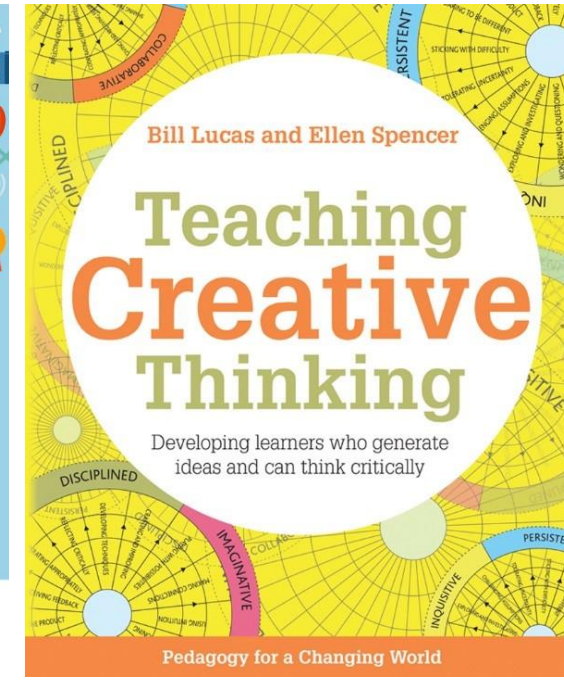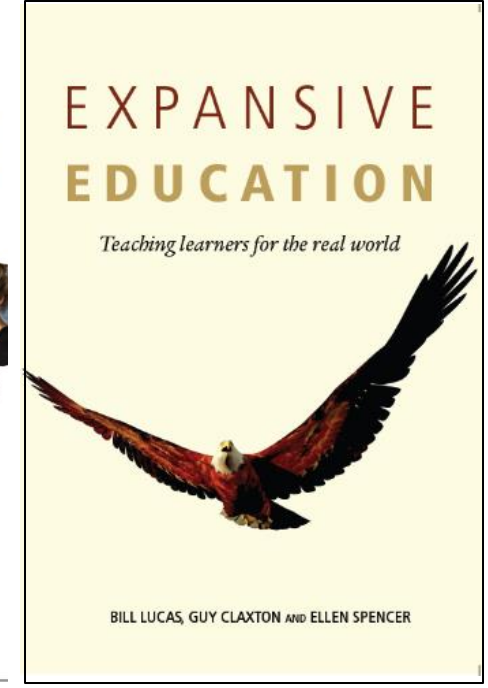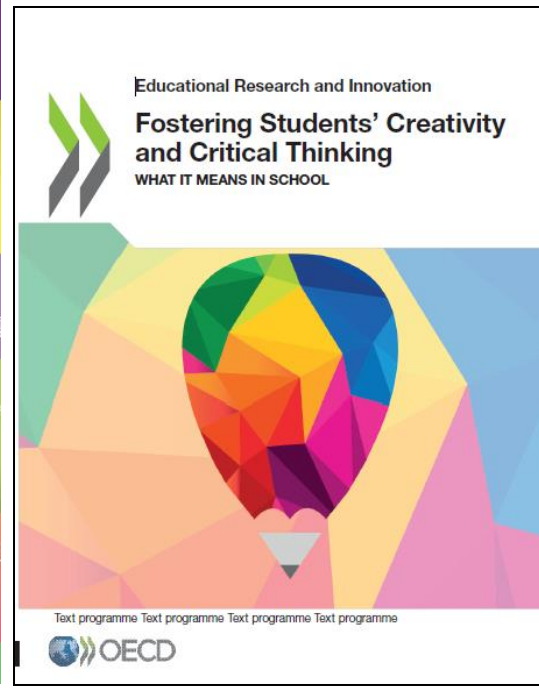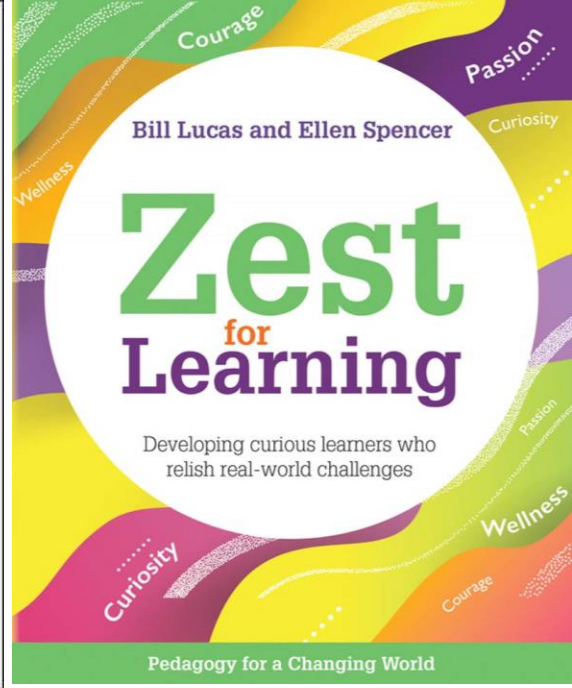
Professor Bill Lucas
@LucasLearn #CreativityExchange

Centre for Real-World Learning,

Guy Claxton · Bill Lucas
with forewords by Professor Tanya Byron and Octavius Black

Educating Ruby

what our children really need to learn

confidence, curiosity, collaboration, communication, creativity, commitment and craftsmanship

---

Courage · Passion · Curiosity · Wellness · Curiosity · Courage · Wellness · Passion

Bill Lucas and Ellen Spencer

Zest for Learning

Developing curious learners who relish real-world challenges

Pedagogy for a Changing World

Educational Research and Innovation

Fostering Students' Creativity and Critical Thinking

WHAT IT MEANS IN SCHOOL

Text programme Text programme Text programme Text programme

OECD

Creative School Leadership

Bill Lucas

The Creative Schools Program was initiated and is managed by FORM, provided by the Department of Education and is financially supported by the Western Australian Government.

FORM. building a state of creativity

EXPANSIVE EDUCATION

Teaching learners for the real world

BILL LUCAS, GUY CLAXTON AND ELLEN SPENCER

T TIMES Education Commission

BRINGING OUT THE BEST

How to transform education and unleash the potential of every child

---

FORM. building a state of creativity

A field guide to assessing **creative thinking in schools**

Bill Lucas

RA RETHINKING ASSESSMENT · creative schools

Creative leadership to develop creativity and creative thinking in English schools

A review of the evidence

Bill Lucas, Ellen Spencer and Louise Stoll

THE MERCERS' COMPANY · UNIVERSITY OF WINCHESTER · CENTRE FOR REAL-WORLD LEARNING

Bill Lucas and Ellen Spencer

Teaching Creative Thinking

Developing learners who generate ideas and can think critically

Pedagogy for a Changing World

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02 CSE LEADING EDUCATION SERIES APRIL 2021

Rethinking assessment in education: The case for change

BILL LUCAS

RA RETHINKING ASSESSMENT · CSE CENTRE FOR STRATEGIC EDUCATION

Warm-Up 1
Explore Creativity and Creative Thinking

CREATIVE THINKING IN SCHOOLS

A LEADERSHIP PLAYBOOK

Bill Lucas, Ellen Spencer, Louise Stoll, Di Fisher-Naylor, Nia Richards, Sian James and Katy Milne

---

Activity 1
Understand the Essence of Creativity

This activity might develop your creative habit of being

Purpose

In order to focus on developing the creativity of children and young people in schools, it's essential to have a shared understanding of what it means to be creative. This activity provides a summary of the long history of creativity research in relation to education. You'll learn about the degree to which there's consensus on the meaning of creativity and what it entails. You'll also be presented with a helpful framework for understanding the habits of a creative thinker. This key reading is aimed at creative leaders and others at all levels of the organisation.

Resources and setting up

- Resource 1: Five Creative Habits Framework
- Resource 2: Descriptions of the Creative Habits

A creativity in schools timeline

Guilford · NACCCE · Creative Partnerships · Four C model, Kaufman and Beghetto · Five Creative Habits Framework · World Economic F...

1950 1999 2002 2009 2013 2015 2017

🕐 1 hour

Activity 2
Find the Creative You

This activity might develop your creative habit of being . . .

Exploring & investigating — Cooperating appropriately / Giving & receiving feedback / Sharing the product — Reflecting...

Purpose

Myths surrounding creativity and educators' perceptions about their own capacity to be creative can be a common barrier when considering broader pedagogical approaches. This activity aims to highlight your existing strengths, skills, knowledge, experiences and qualities and explore how they might complement the five creative habits.

Resources and se...

- Large sheets of together – large have an outline o
- Different-colou...
- Resource 1: Fiv
- Resource 2: Des Habits
- Encourage parti they don't know regularly
- This activity ass Understand the

Getting going

STEP 1 5 minutes

Working in pairs, draw around each other's bodies on the paper.

STEP 2 15 minutes

Working individuall the strengths, skills qualities you posse Think about where located and plot th passion for your w your questioning s...

Activit...

🕐 1 hour

Activity 3
Explore Creative Habits

This activity might develop your creative habit of being . . .

Wondering & questioning / Exploring & investigating / Challenging assumptions — Tolerating uncertainty — Cooperating appropriately / Giving & receiving feedback — Reflecting critically — Making connections / Using intuition

Purpose

It's essential to develop a shared understanding of what creativity is. This activity helps you to explore the creative habits and their sub-habits using the Five Creative Habits Framework. It can also be easily adapted to fit with your own definition. It helps people to investigate and develop a shared understanding of what creativity is and to examine their own creative habits, including their strengths and potential development needs.

Resources and setting up

- Resource 1: Five Creative Habits Framework
- Resource 3: Creativity Habits Web Template (one for each person)
- Resource 4: Creative Individuals Are ... (one of these sheets for each group of four or five). Each sheet includes one creative habit and its three sub-habits
- Felt pen or marker pen (one for each person)
- Rolls of different-coloured electrical tape (one roll for each person)
- Masking tape (one roll for each small group of four or five)
- Scissors (two pairs for each small group)

Refer to the image and set up the creativity webs on the floor in advance of the activity. Use:

- The masking tape to create the creativity webs on the floor.
- A marker pen (to write 1, 2, 3, 4 and 5 on each axis with 1 being closest to the centre and 5 at the outside).
- The five sheets from Resource 4 that detail the sub-habits for each creative habit. One of the five creative habits is placed at the end of each axis of the web, using Resource 3 to ensure they're placed in the correct order.

Place a set of coloured tape and two pairs of scissors near each creativity web.

Y7CM		1 9.15 to 9.55	2 9.55 to 10.45		3 11.05 to 11.55	4 11.55 to 12.45		5 1.45 to 2.35	6 2.35 to 3.25
Monday		Literacy	English		Maths	ICT		PSCHE	Geography
Tuesday		English	Art		French	Science		Design Technology	
Wednesday		Literacy	DT		Art	Drama		ICT	Science
Thursday		PE						History	PSCHE

Daily Assembly Time (9.00 –9.1...

Break time (10.45 – 11.05)

Lunch time (12.45 – 1.45)

Creativity on the timetable?

A creativity in schools timeline

Guilford — 1950
NACCCE — 1999
Creative Partnerships — 2002
5 creative habits model, Lucas et al — 2013
WEF and CCR/Testing in Victoria, Australia — 2015
Durham Commission — 2019
OECD-CERI Fostering Critical/Creative Thinking — 2019
Creativity Exchange — 2021
Creativity Collaboratives — 2021
PISA CT Test Global Inst. of CT — 2022
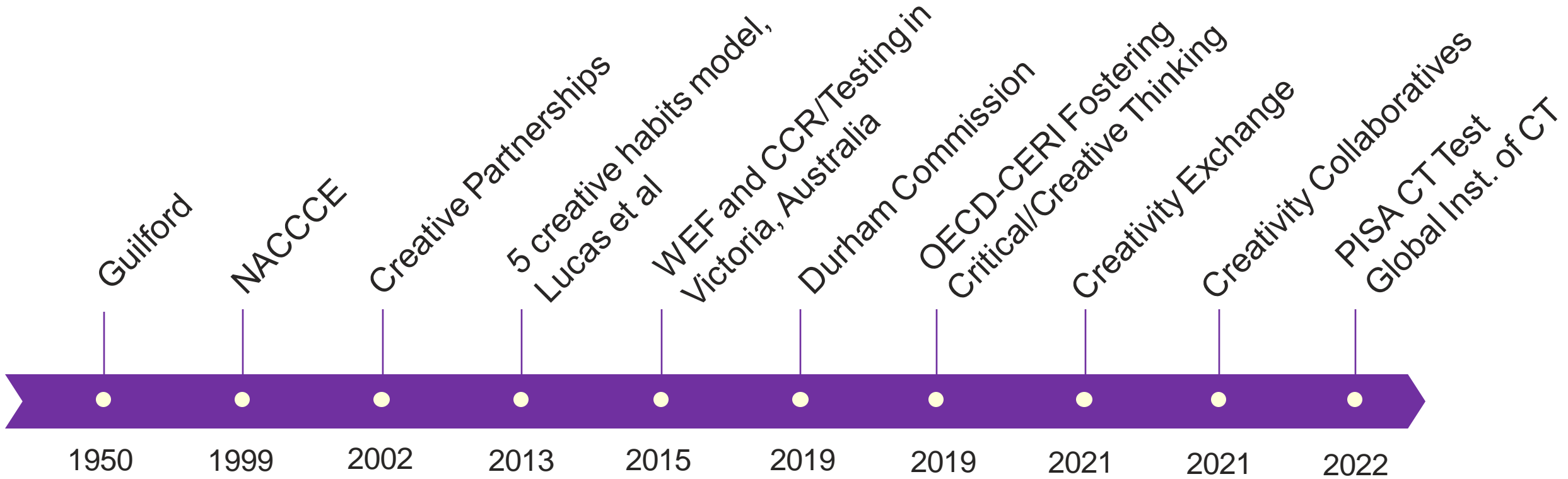
[What it is]

'Imaginative activity fashioned so as to produce outcomes that are both original and of value.'   1999

UK National Advisory Committee on Creative and Cultural Education
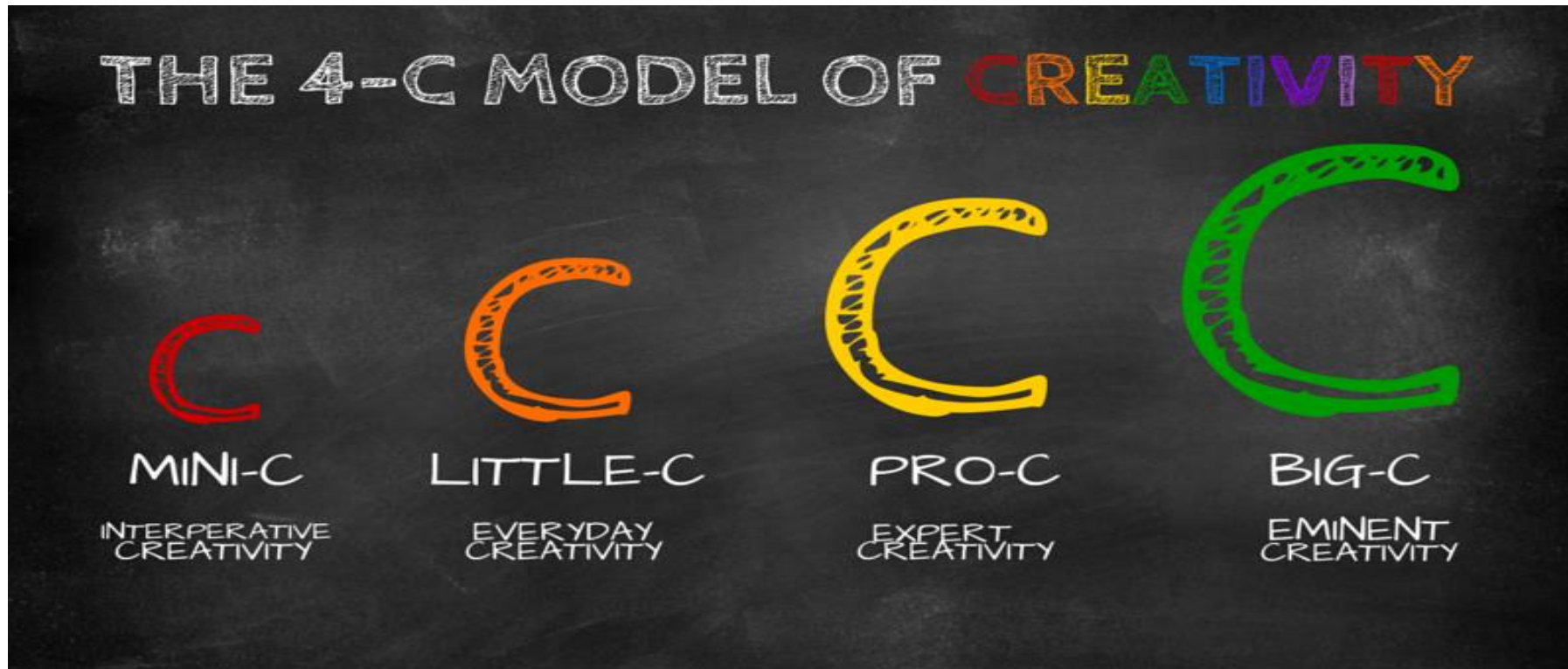
2009

Our model of creativity

2012

World Economic Forum — 2015

Center for Curriculum Redesign

THE AGE

WORLD FIRST
CREATIVE THINKING TESTS FOR VICTORIAN STUDENTS

THE AGE

INDEPENDENT. ALWAYS.

IN A WORLD FIRST, VICTORIA IS TESTING STUDENTS WITH TOP-SECRET QUESTIONS TO SEE IF THEY HAVE THE SKILLS TO PREPARE THEM FOR LIFE.

CAN YOUR CHILD ANSWER THIS CURLY QUESTION?
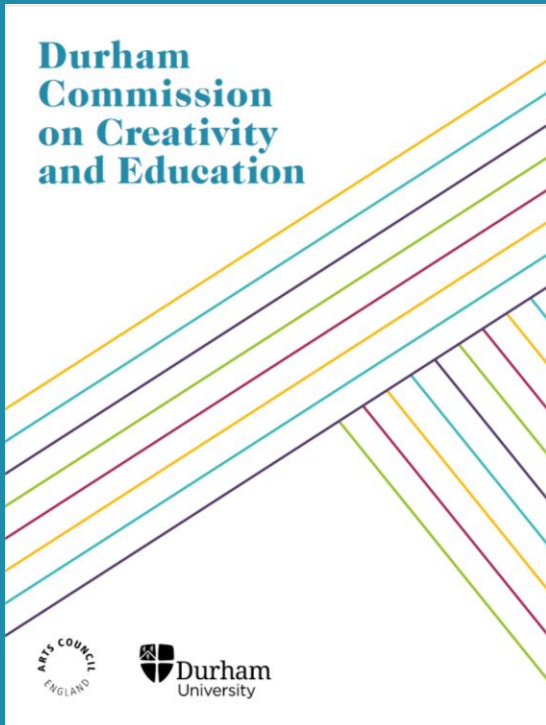TAKE THE TEST ON PA...

NOW THAT'S CREATIVE THINKING

HENRIETTA COOK REPORTS NEWS

DURHAM COMMISSION DEFINITIONS

Durham
Commission
on Creativity
and Education

ARTS COUNCIL ENGLAND | Durham University

Creativity: The capacity to imagine, conceive, express, or make something that was not there before.
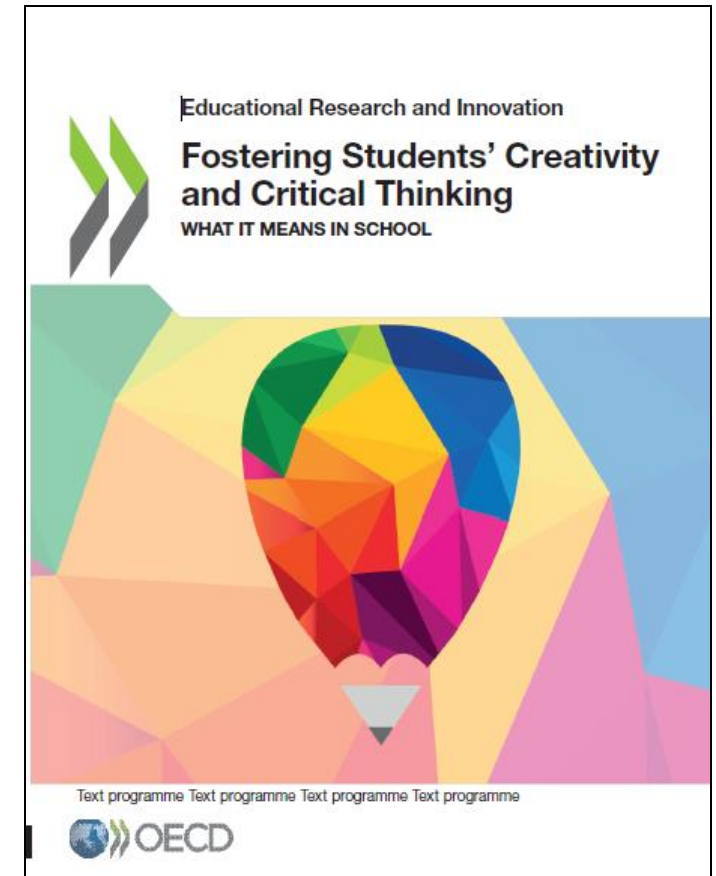
Creative thinking: A process through which knowledge, intuition and skills are applied to imagine, express or make something novel or individual in its contexts. Creative thinking is present in all areas of life. It may appear spontaneous, but it can be underpinned by perseverance, experimentation, critical thinking and collaboration.

Teaching for creativity: Explicitly using pedagogies and practices that cultivate creativity in young people.
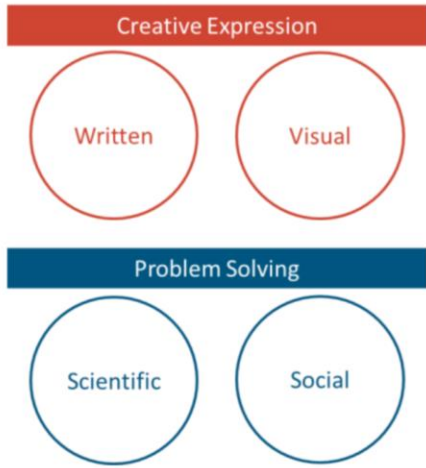
2019

Researching students' creativity

- Creativity and critical thinking can be learnt and assessed in all subjects
- We need to be intentional and thus clear about what we try to achieve: rubrics help clarify
- Teachers need support: professional learning opportunities and scaffolding (resources, examples, peer learning, etc.)
- It is not easy, it takes time, but it is feasible – and real teachers in real-life settings have already done it
- There are many different ways to do it (and just starting to move the needle is an important step)

Educational Research and Innovation

Fostering Students' Creativity and Critical Thinking
WHAT IT MEANS IN SCHOOL

Text programme Text programme Text programme Text programme

OECD

2019

Figure 2. Proposed focus domains for the assessment

Creative Expression

Written | Visual

Problem Solving

Scientific | Social

2022

OECD PISA

'Creative Thinking in PISA 2022 is defined as the competence to engage productively in the generation, evaluation and improvement of ideas, that can result in original and effective solutions, advances in knowledge and impactful expressions of imagination.'

OECD Directorate for Education and Skills, PISA 2022 Creative Thinking

THINKING OUTSIDE THE BOX
The PISA 2022 Creative Thinking Assessment

OECD
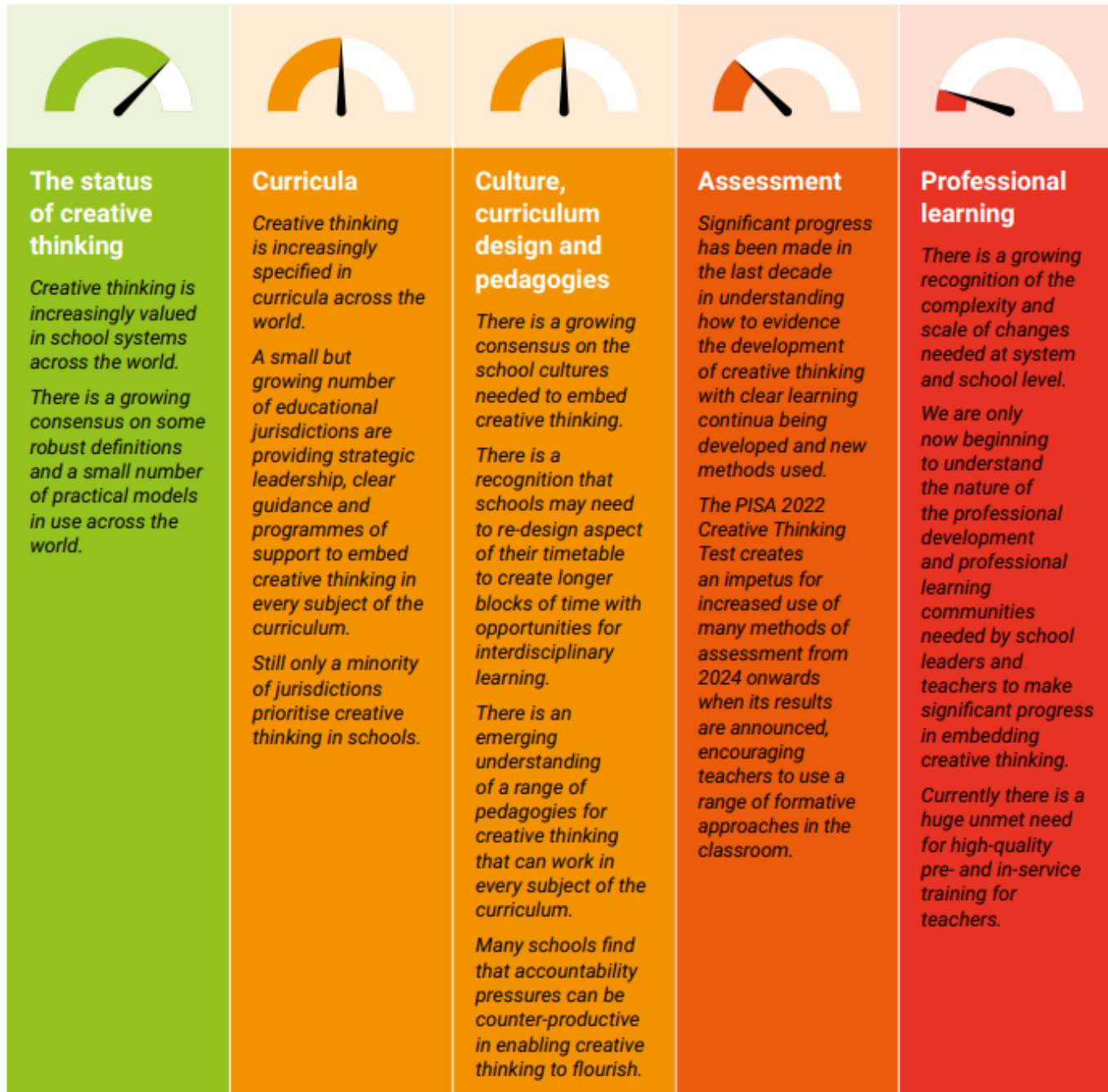BETTER POLICIES FOR BETTER LIVES
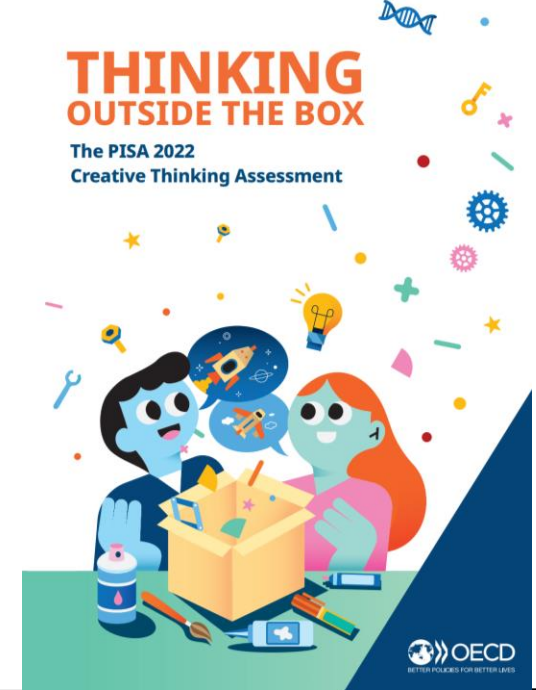
PISA 2021 CREATIVE THINKING FRAMEWORK (THIRD DRAFT)

April 2019

OECD member countries and Associates decided to postpone the PISA 2021 assessment to 2022 to reflect post-Covid difficulties. This draft vision was created before the crisis. The final version will reflect the new name of the cycle "PISA 2022".

The status of creative thinking

Creative thinking is increasingly valued in school systems across the world.

There is a growing consensus on some robust definitions and a small number of practical models in use across the world.

Curricula

Creative thinking is increasingly specified in curricula across the world.

A small but growing number of educational jurisdictions are providing strategic leadership, clear guidance and programmes of support to embed creative thinking in every subject of the curriculum.

Still only a minority of jurisdictions prioritise creative thinking in schools.

Culture, curriculum design and pedagogies

There is a growing consensus on the school cultures needed to embed creative thinking.

There is a recognition that schools may need to re-design aspect of their timetable to create longer blocks of time with opportunities for interdisciplinary learning.

There is an emerging understanding of a range of pedagogies for creative thinking that can work in every subject of the curriculum.

Many schools find that accountability pressures can be counter-productive in enabling creative thinking to flourish.

Assessment

Significant progress has been made in the last decade in understanding how to evidence the development of creative thinking with clear learning continua being developed and new methods used.

The PISA 2022 Creative Thinking Test creates an impetus for increased use of many methods of assessment from 2024 onwards when its results are announced, encouraging teachers to use a range of formative approaches in the classroom.

Professional learning

There is a growing recognition of the complexity and scale of changes needed at system and school level.

We are only now beginning to understand the nature of the professional development and professional learning communities needed by school leaders and teachers to make significant progress in embedding creative thinking.

Currently there is a huge unmet need for high-quality pre- and in-service training for teachers.

GLOBAL INSTITUTE OF CREATIVE THINKING

2022

GLOBAL INSTITUTE OF CREATIVE THINKING

Creative thinking in schools across the world

A snapshot of progress in 2022
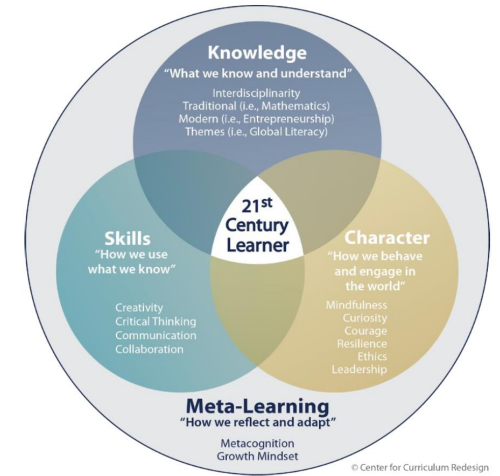
BILL LUCAS

International
National
State
School

	Competency	Inclusion	Identification	Progression	Pedagogy	Assessment
Skills	Creativity	21	12	5	0	0
	Critical thinking	21	11	6	0	0
	Communication	22	11	5	0	0
	Collaboration	21	10	6	0	0
Character	Mindfulness	17	10	5	0	0
	Curiosity	17	7	3	0	0
	Courage	9	5	5	0	0
	Resilience	15	8	6	0	0
	Ethics	18	10	4	0	0
	Leadership	10	7	4	0	0
Meta-learning	Metacognition	14	7	5	0	0
	Growth mindset	14	6	5	0	0

Knowledge
"What we know and understand"
Interdisciplinarity
Traditional (i.e., Mathematics)
Modern (i.e., Entrepreneurship)
Themes (i.e., Global Literacy)

Skills
"How we use what we know"
Creativity
Critical Thinking
Communication
Collaboration

21st Century Learner

Character
"How we behave and engage in the world"
Mindfulness
Curiosity
Courage
Resilience
Ethics
Leadership

Meta-Learning
"How we reflect and adapt"
Metacognition
Growth Mindset

© Center for Curriculum Redesign

CENTER FOR CURRICULUM REDESIGN   BROOKINGS

Competencies for the 21st century
Jurisdictional progress

Robert Taylor
Charles Fadel
Helyn Kim
Esther Care

BRIEF   October 2020

Three Cross-curriculum priorities

Sustainability

Asia and Australia's engagement with Asia

Aboriginal and Torres Strait Islander Histories and Cultures

English
Mathematics
Science
History
Geography
Economics, Business
Civics and Citizenship
HUMANITIES & SOCIAL SCIENCES
The Arts
Health and Physical Education
Languages
Design & Technologies
Digital Technologies
TECHNOLGIES

Literacy
Numeracy
ICT Capability
Critical and Creative Thinking
Personal and Social Capability
Intercultural Understanding
Ethical Understanding

Eight Learning areas

Seven General capabilities

Australia

General capabilities

Reflecting on thinking and processes

Inquiring - identifying exploring and organising information and ideas

Critical and Creative Thinking

Analysing, synthesising and evaluating reasoning and procedures

Generating ideas, possibilities and actions
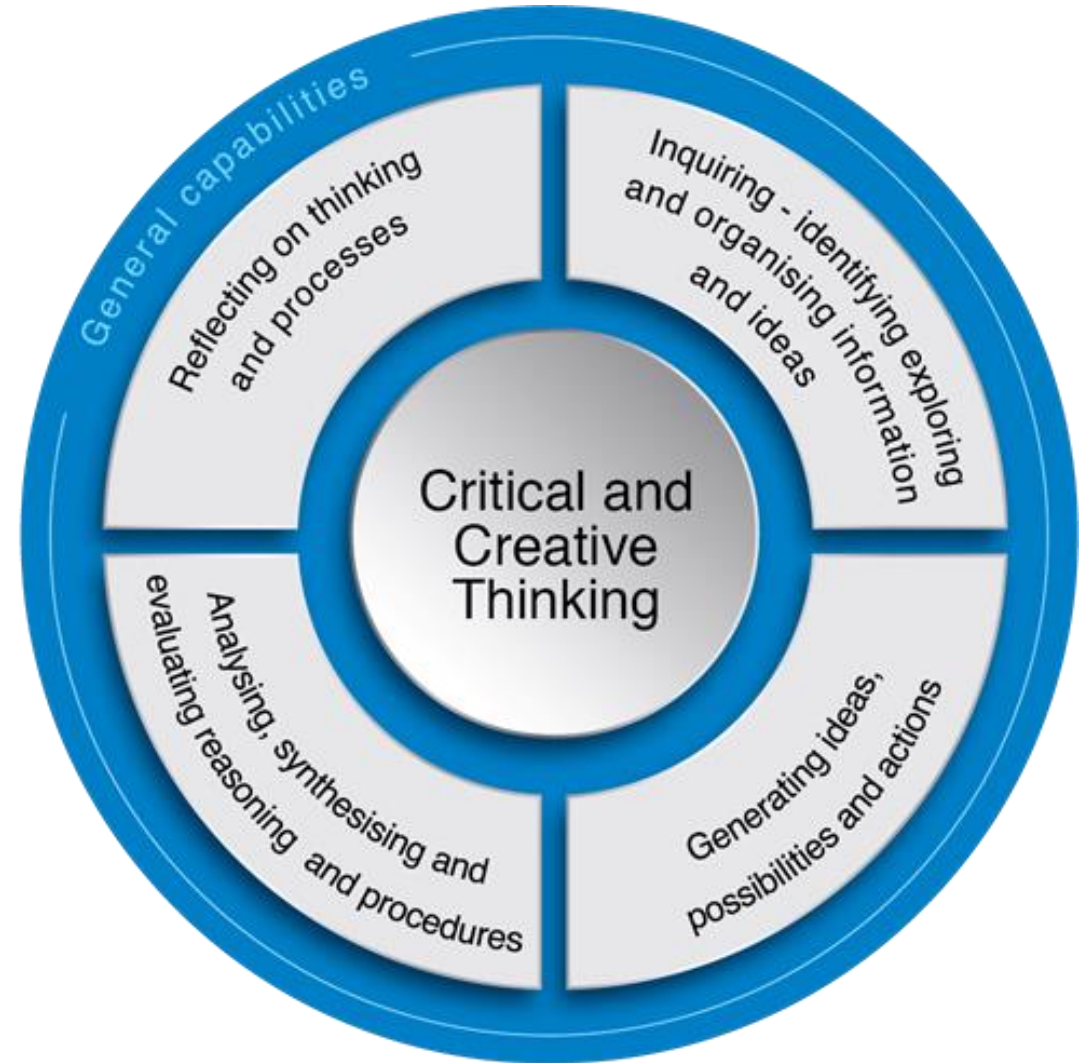
Canada
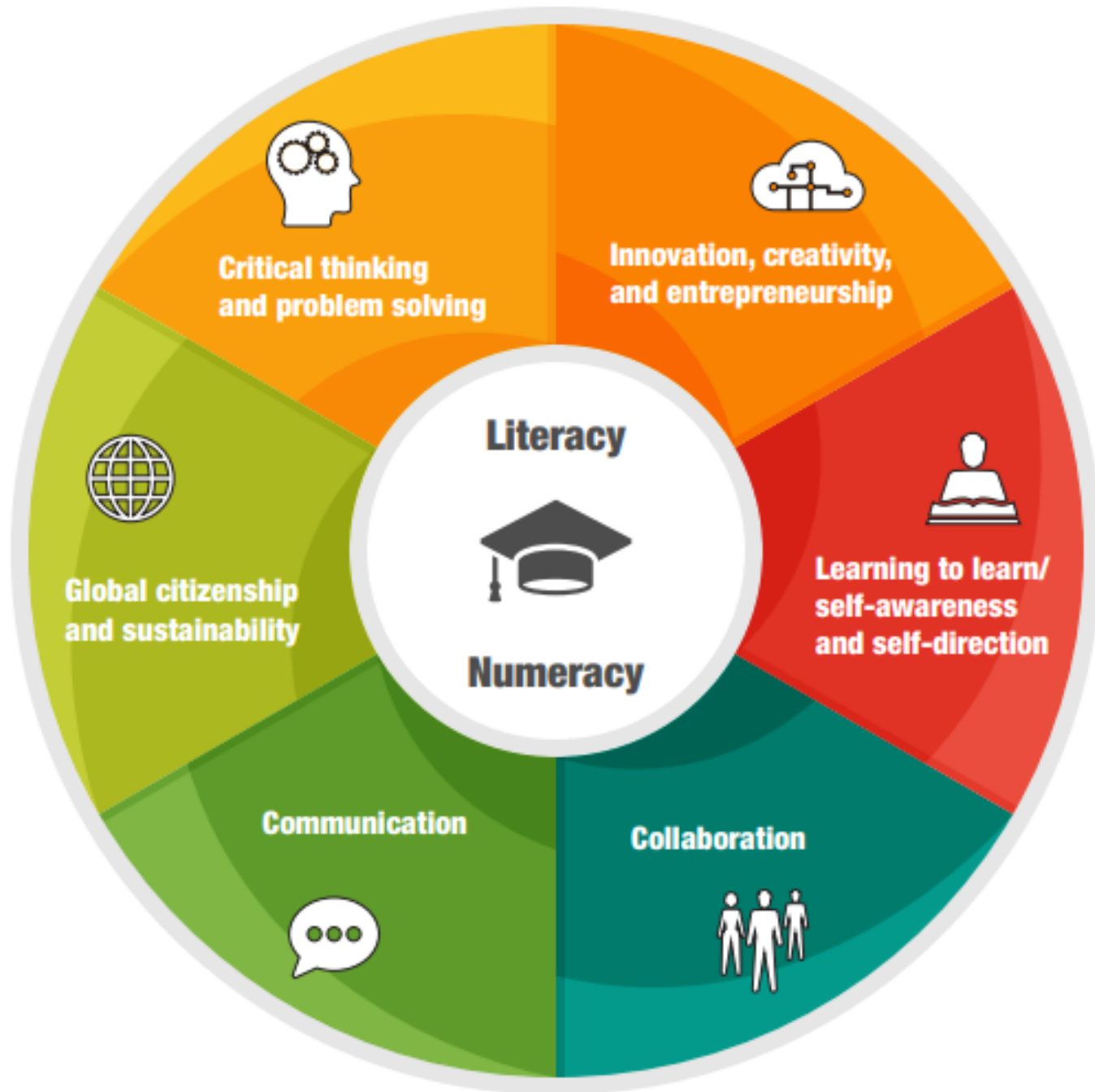
China

Alberta, Canada
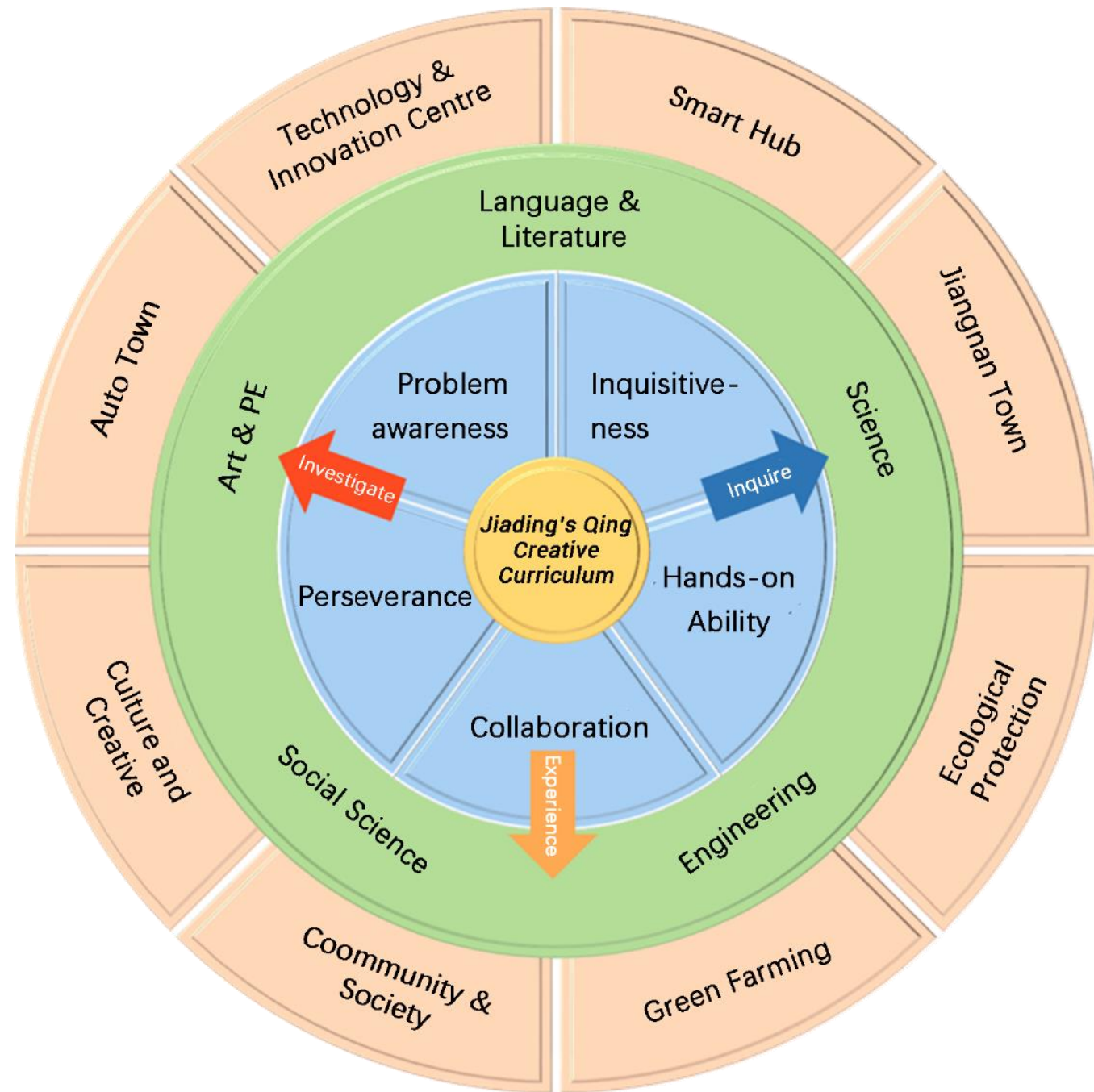
Competencies and Current Programs of Study

MATHEMATICS

Competencies are combinations of attitudes, skills and knowledge that students develop and apply for successful learning, living and working. In school, competencies help students achieve learning outcomes and transfer their learning to new situations. Alberta's curriculum promotes the development of eight competencies, which are a streamlined expression of the competencies identified in the Ministerial Order on Student Learning (#001/2013). The following are examples that describe how competencies may be expressed within the context of Alberta's current Kindergarten to Grade 12 Mathematics programs of study.

CRITICAL THINKING in mathematics involves using reasoning to synthesize or evaluate mathematical ideas. Students:

- make mathematical statements about patterns or relationships;
- apply criteria to analyze or validate mathematical processes, solutions or claims;
- use inductive reasoning to generalize patterns or connections;
- use deductive reasoning and/or logic to check or justify mathematical arguments; and
- investigate the impact of assumptions on mathematical processes, solutions or conclusions.

PROBLEM SOLVING in mathematics involves using mathematical processes or strategies to generate solutions or to support decision-making. Students:

- apply prior knowledge or experience to identify mathematical problems;
- draw upon known mathematical concepts to develop strategies to solve unfamiliar problems;
- accept that mathematical problems may lead to multiple solutions;
- recognize situations where there are no solutions; and
- demonstrate flexibility, persistence and a willingness to take risks to try different mathematical approaches to solving problems.

MANAGING INFORMATION in mathematics involves collecting, processing and representing mathematical information and ideas. Students:

- collect pertinent information to make sense of mathematical ideas in a variety of contexts;
- organize or manipulate data to determine mathematical patterns;
- use appropriate tools to represent, model or share mathematical information or ideas; and
- value the role of mathematical representations to reliably depict or verify situations and/or patterns.

CREATIVITY AND INNOVATION in mathematics involves using flexible thinking and approaches to connect or extend mathematical ideas in new ways. Students:

- explore mathematical ideas or relationships by creating concrete, pictorial or symbolic models;
- make new connections between mathematical concepts;
- create models to describe mathematical ideas or patterns; and
- take risks and think flexibly to play with different mathematical concepts and processes.

Alberta Government

CREATIVITY AND INNOVATION in mathematics
involves using flexible thinking and approaches to connect or extend mathematical ideas in new ways. Students:

- explore mathematical ideas or relationships by creating concrete, pictorial or symbolic models;

- make new connections between mathematical concepts;

- create models to describe mathematical ideas or patterns; and

- take risks and think flexibly to play with different mathematical concepts and processes.

Victoria, Australia

Critical and Creative Thinking: Foundation – Level 10

| Foundation to Level 2	Levels 3 and 4	Levels 5 and 6	Levels 7 and 8	Levels 9 and 10
Questions and Possibilities				
Identify, describe and use different kinds of question stems to gather information and ideas	Construct and use open and closed questions for different purposes	Examine how different kinds of questions can be used to identify and clarify information, ideas and possibilities	Consider how to approach and use questions that have different elements, including factual, temporal and conceptual elements	Investigate the characteristics of effective questions in different contexts to examine information and test possibilities
Consider personal reactions to situations or problems and how these reactions may influence thinking	Explore reactions to a given situation or problem and consider the effect of pre-established preferences	Experiment with alternative ideas and actions by setting preconceptions to one side	Suspend judgements temporarily and consider how preconceptions may limit ideas and alternatives	Suspend judgements to allow new possibilities to emerge and investigate how this can broaden ideas and solutions
Make simple modifications to known ideas and routine solutions to generate some different ideas and possibilities	Investigate different techniques to sort facts and extend known ideas to generate novel and imaginative ideas	Identify and form links and patterns from multiple information sources to generate non-routine ideas and possibilities	Synthesise information from multiple sources and use lateral thinking techniques to draw parallels between known and new solutions and ideas when creating original proposals and artefacts	Challenge previously held assumptions and create new links, proposals and artefacts by investigating ideas that provoke shifts in perspectives and cross boundaries to generate ideas and solutions
Reasoning				
Examine words that show reasons and words that show conclusions	Examine and use the structure of a basic argument, with an aim, reasons and conclusion to present a point of view	Investigate common reasoning errors including contradiction and inconsistency, and the influence of context	Examine common reasoning errors including circular arguments and cause and effect fallacies	Examine a range of rhetorical devices and reasoning errors, including false dichotomies and begging the question
Compare and contrast information and ideas in own and others reasoning	Distinguish between main and peripheral ideas in own and others information and points of view	Consider the importance of giving reasons and evidence and how the strength of these can be evaluated	Investigate the difference between a description, an explanation and a correlation and scepticism about cause and effect	Examine how to identify and analyse suppressed premises and assumptions
Consider how reasons and examples are used to support a point of view and illustrate meaning	Investigate why and when the consequences of a point of view should be considered	Consider when analogies might be used in expressing a point of view and how they should be expressed and evaluated	Investigate when counter examples might be used in expressing a point of view	Investigate the nature and use of counter examples structured as arguments
	Identify and use 'If, then…' and 'what if…' reasoning	Examine the difference between valid and sound arguments and between inductive and deductive reasoning, and their degrees of certainty	Consider how to settle matters of fact and matters of value and the degree of confidence in the conclusions	Consider ambiguity and equivocation and how they affect the strength of arguments
	Explore distinctions when organising and sorting information and ideas from a range of sources	Explore what a criterion is, different kinds of criteria, and how to select appropriate criteria for the purposes of filtering information and ideas	Examine how to select appropriate criteria and how criteria are used in clarifying and challenging arguments and ideas	Investigate use of additional or refined criteria when application of original criteria does not produce a clear conclusion
Meta-Cognition				
Consider ways to express and describe thinking activity, including the expression of feelings about learning, both to others and self	Consider concrete and pictorial models to facilitate thinking, including a range of visualisation strategies	Investigate thinking processes using visual models and language strategies	Consider a range of strategies to represent ideas and explain and justify thinking processes to others	Critically examine their own and others thinking processes and discuss factors that influence thinking, including cognitive biases
Explore some learning strategies, including planning, repetition, rewording, memorisation, and use of mnemonics	Examine an increased range of learning strategies, including visualisation, note-taking, peer instruction and incubation, and reflect on how these can be applied to different tasks to reach a goal	Examine learning strategies, including constructing analogies, visualising ideas, summarising and paraphrasing information and reflect on the application of these strategies in different situations	Examine a range of learning strategies and how to select strategies that best meet the requirements of a task	Investigate how the use of a range of learning strategies can be monitored, evaluated and re-directed as necessary
Investigate ways to problem-solve, using egocentric and experiential language	Investigate a range of problem-solving strategies, including brainstorming, identifying, comparing and selecting options, and developing and testing hypotheses	Investigate how ideas and problems can be disaggregated into smaller elements or ideas, how criteria can be used to identify gaps in existing knowledge, and assess and test ideas and proposals	Consider how problems can be segmented into discrete stages, new knowledge synthesised during problem-solving and criteria used to assess emerging ideas and proposals	Investigate the kind of criteria that can be used to rationally evaluate the quality of ideas and proposals, including the qualities of viability and workability

Western Australia

THOMAS TALLIS SCHOOL

Education to understand the world and change it for the better

TALLIS Habits Pedagogy Wheel

The **TALLIS** Habits are based on Lucas, Spencer, and Claxton (2013) *Progression in Student Creativity in School* OECD Publishing.

Sydney, Australia
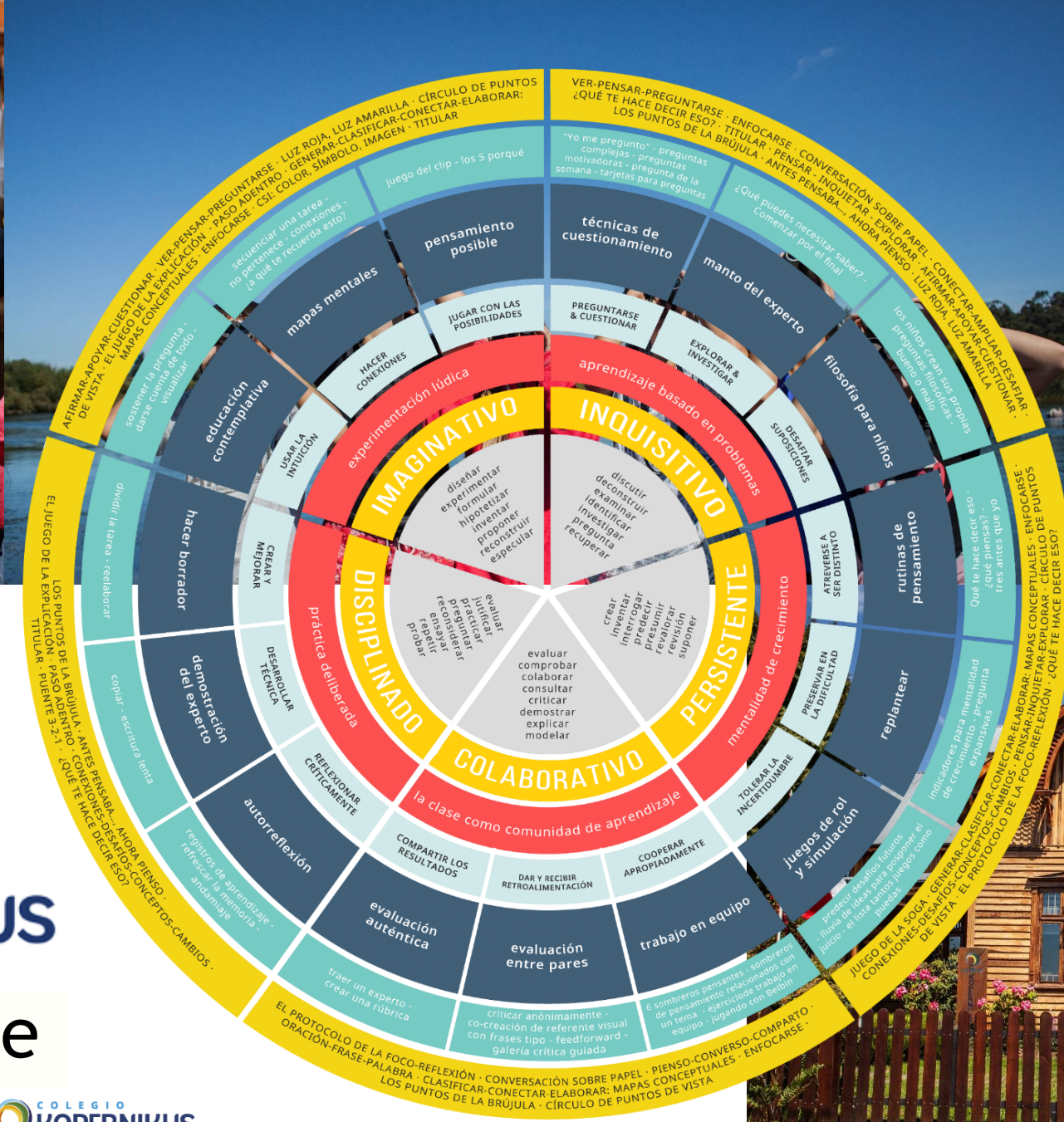
Frutillar, Chile

COLEGIO KOPERNIKUS

Los **5 hábitos de la mente** estructurado por **Colegio Kopernikus** basado en Lucas, Spencer & Claxton (2013) *Progression in Student Creativity in School* OECD Publishing
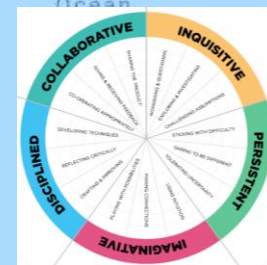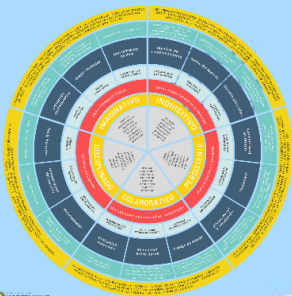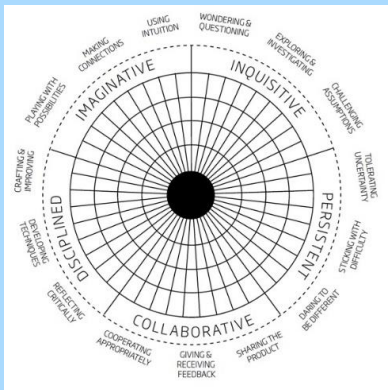
Creativity Exchange is a space for school leaders, teachers, those working in cultural organisations, scientists, researchers and parents to share ideas about how to teach for creativity and develop young people's creativity at and beyond school.

ABOUT

Creativity Collaboratives

Diagram labels

imaginative
- playing with possibilities
- making connections
- using intuition

inquisitive
- wondering & questioning
- challenging assumptions
- exploring & investigating

persistent
- daring to be different
- sticking with difficulty
- tolerating uncertainty

collaborative
- sharing the product
- giving & receiving feedback
- co-operating appropriately

disciplined
- developing techniques
- reflecting critically
- crafting & improving
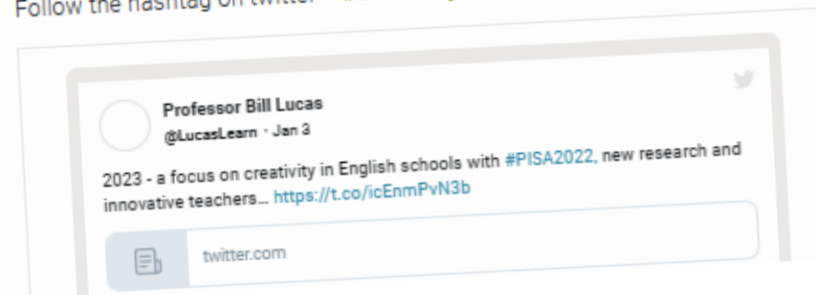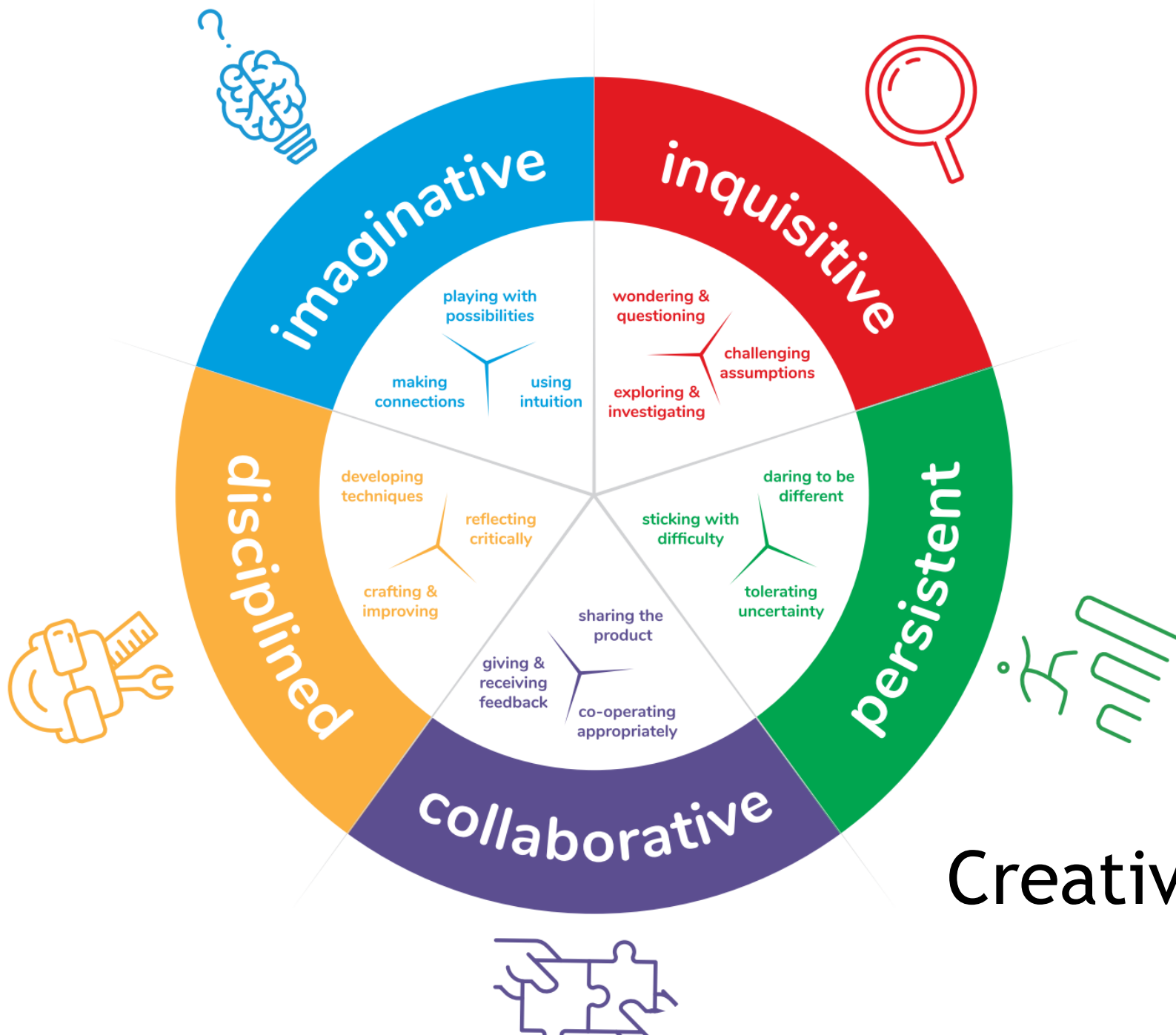
Tweet

Tweet

CCE @CCEinsights

At the end of our first face to face Creativity Collaborative network meeting on Monday, one of the schools said they liked the 'element of practice what you preach'..@CCEinsights this is exactly what we believe in doing😀 @LucasLearn #CreativityExchange

Creativity Collaboratives

Duchess's High School Trust

3:41 pm · 18 Feb 2022 · Twitter Web App

5 Retweets   9 Likes

Formal teaching ⟷ Informal learning

[How to cultivate it]

Creative thinking is not a magic power, though, it can be learned and it can be taught. Every individual, to a greater or smaller degree, has the potential to think creatively. It is therefore unsurprising that school curricula around the world seek to give creativity greater emphasis, both within and across subject disciplines.

Andreas Schleicher

GLOBAL INSTITUTE of
CREATIVE
THINKING

Creative thinking in schools across the world

A snapshot of progress in 2022

BILL LUCAS
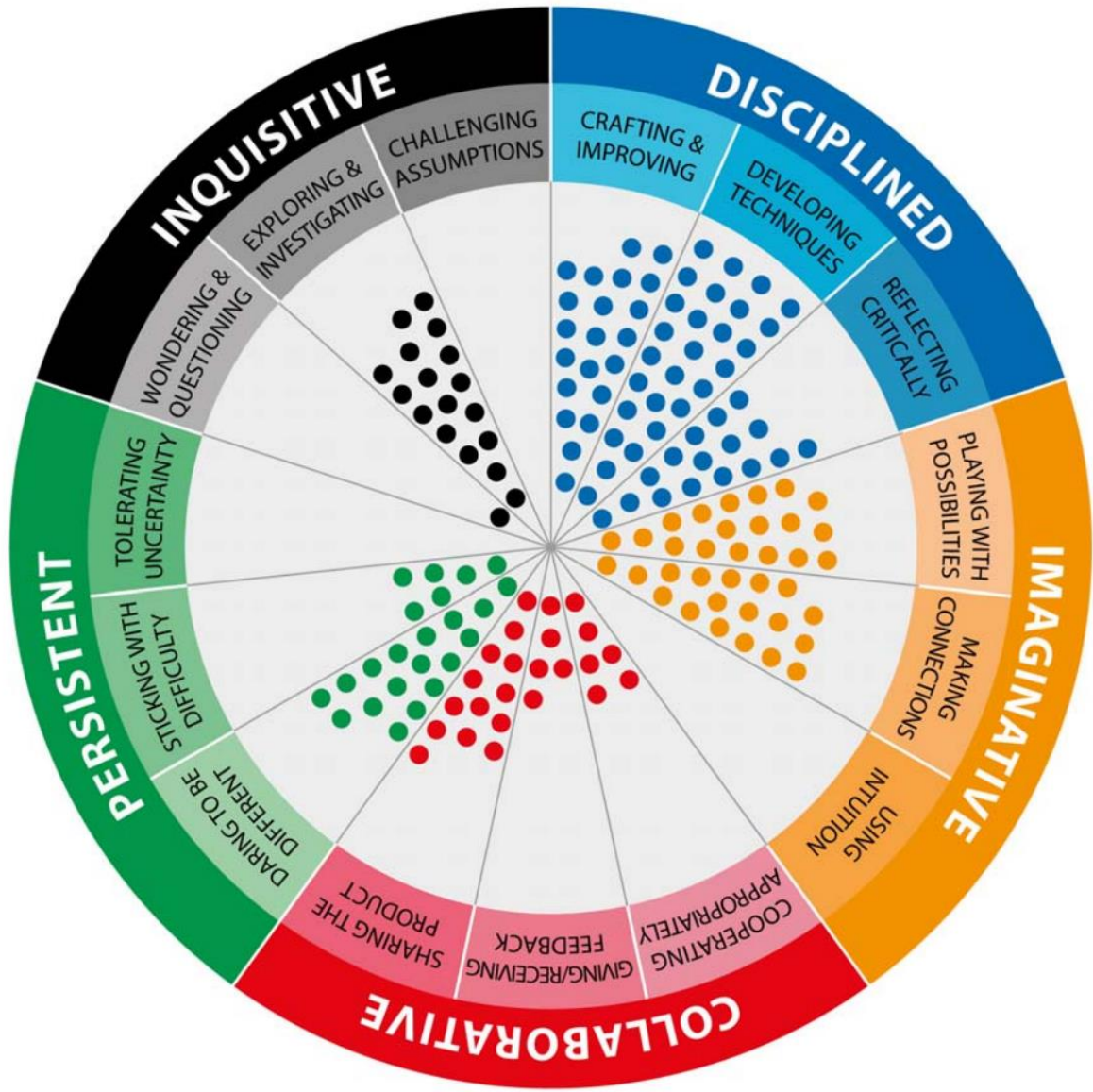
Create the culture

1. Learning almost always framed by engaging questions which have no one right answer
2. Space for activities which are curious, authentic, extended in length, sometimes beyond school, collaborative and reflective
3. The opportunity for play and experimentation
4. Opportunity for generative thought, where ideas are greeted openly
5. Opportunity for critical reflection in a supportive environment
6. Respect for difference and the creativity of others
7. Makes creative processes visible and valued
8. Actively engages students as co-designers
9. Integrates a range of assessment practices within teaching
10. Leaves space for the unexpected

Creative thinking in every subject

Art and design
Citizenship
Computing
Design and technology
Drama
English
Geography
History
Languages
Maths
Music
Science
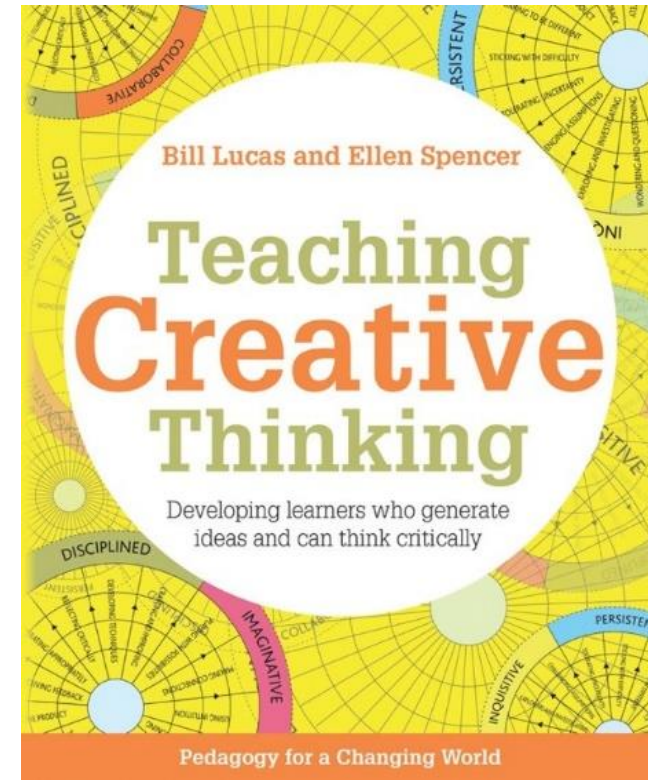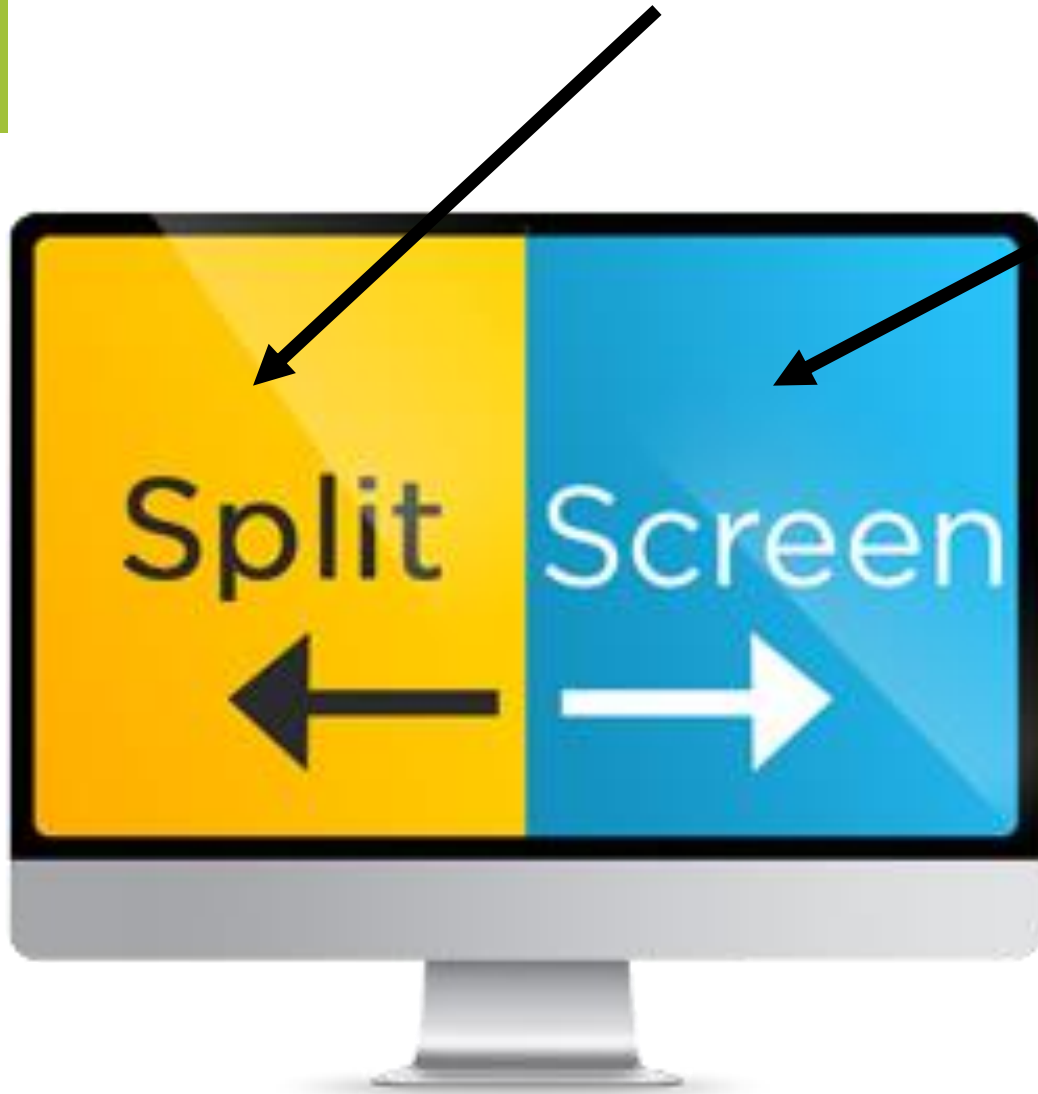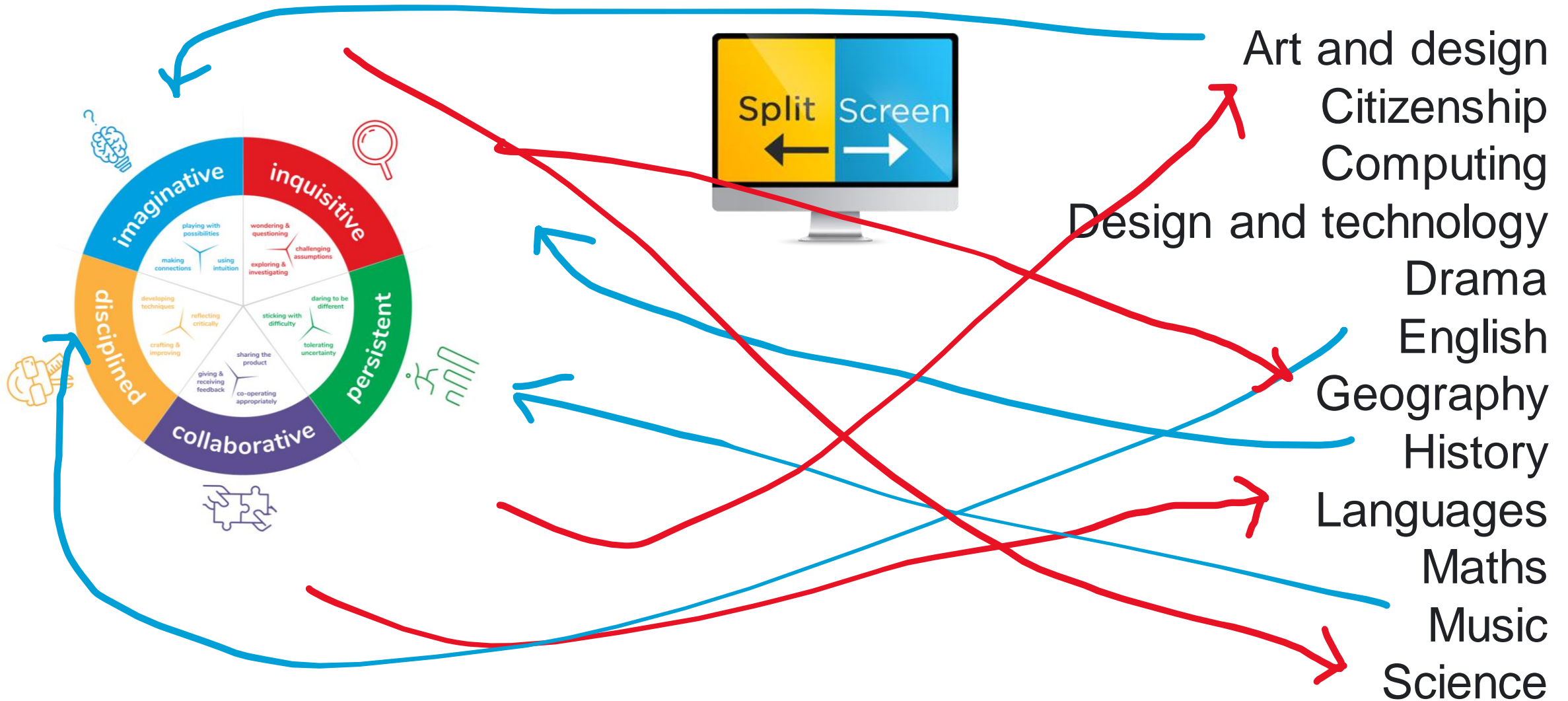
SCIENCE

Competencies are combinations of attitudes, skills and knowledge that stud[...] for successful learning, living and working. In school, competencies help stu[...] outcomes and transfer their learning to new situations. Alberta's curriculum [...] of eight competencies, which are a streamlined expression of the competer[...] Ministerial Order on Student Learning (#001/2013). The following are examp[...] competencies may be expressed within the context of Alberta's current Kin[...] Science programs of study.

CRITICAL THINKING in science involves using reasoning to question and test ideas, build understanding and develop scientific literacy. Students:

- use relevant criteria to evaluate scientific data, claims, theories or statements;
- reason inductively and deductively to form and test hypotheses, categorize data or draw conclusions;
- investigate the impact of assumptions and uncertainty when testing or interpreting hypotheses, generalizations and theories; and
- apply scientific information with objectivity or fair-mindedness to make judgements or draw conclusions.

MANAGING INFORMATION in science involves accessing, collecting, processing and validating information to develop, confirm or apply scientific knowledge. Students:

- carry out procedures to accurately and efficiently collect data or acquire scientific information;
- synthesize and present data or information for effective and consistent interpretation;
- use appropriate conventions to reference scientific data or information;
- report scientific data or information with objectivity and honesty; and
- respect how the integrity and reliability of evidence is critical to the validation of scientific claims.

PROBLEM SOLVIN[...] developing and apply[...] knowledge or techno[...] Students:

- design, evaluate an[...] scientific inquiry to [...] world;
- select appropriate t[...] and analyze data a[...]
- appreciate that scie[...] problems can be ap[...] perspectives to yiel[...]
- employ a variety of [...] problems with flexib[...]

CREATIVITY AND I[...] involves exploring ma[...] to generate new scie[...] processes. Students:

- recognize how new [...] infuence, and are ir[...] knowledge and tech[...]
- demonstrate ingenu[...] designing or adapti[...] devices for a specif[...]
- identify and evaluat[...] scientific informatio[...] and
- are curious, inventiv[...] about the world.

CREATIVITY AND INNOVATION in science involves exploring materials, ideas or resources to generate new scientific ideas, products or processes. Students:

- recognize how new ideas or discoveries infuence, and are influcenced by, scientific knowledge and technologies;

- demonstrate ingenuity and resourcefulness when designing or adapting investigations, models or devices for a specific purpose;

- identify and evaluate potential applications of scientific information, discoveries or technologies; and

- are curious, inventive and open to new ideas about the world.

Make creative thinking visible

PRINCIPLE **3**

VISIBLE THINKING

- Visible Thinking in Action
- Getting Started
- **Thinking Routines**
  - Introduction
  - **Core Routines**
  - Understanding Routines
  - Fairness Routines
  - Truth Routines
  - Creativity Routines
- Thinking Ideals
- School-Wide Culture of Thinking
- VT Network
- What's New

Core Routines

The core routines are a set of seven or so routines that target different types of thinking from across the modules. These routines are easy to get started with and are commonly found in Visible Thinking teachers' toolkits. Try getting started with with one of these routines.

What Makes You Say That? *Interpretation with justification routine*

Think Puzzle Explore *A routine that sets the stage for deeper inquiry*

Think Pair Share *A routine for active reasoning and explanation*

Circle of Viewpoints *A routine for exploring diverse perspectives*

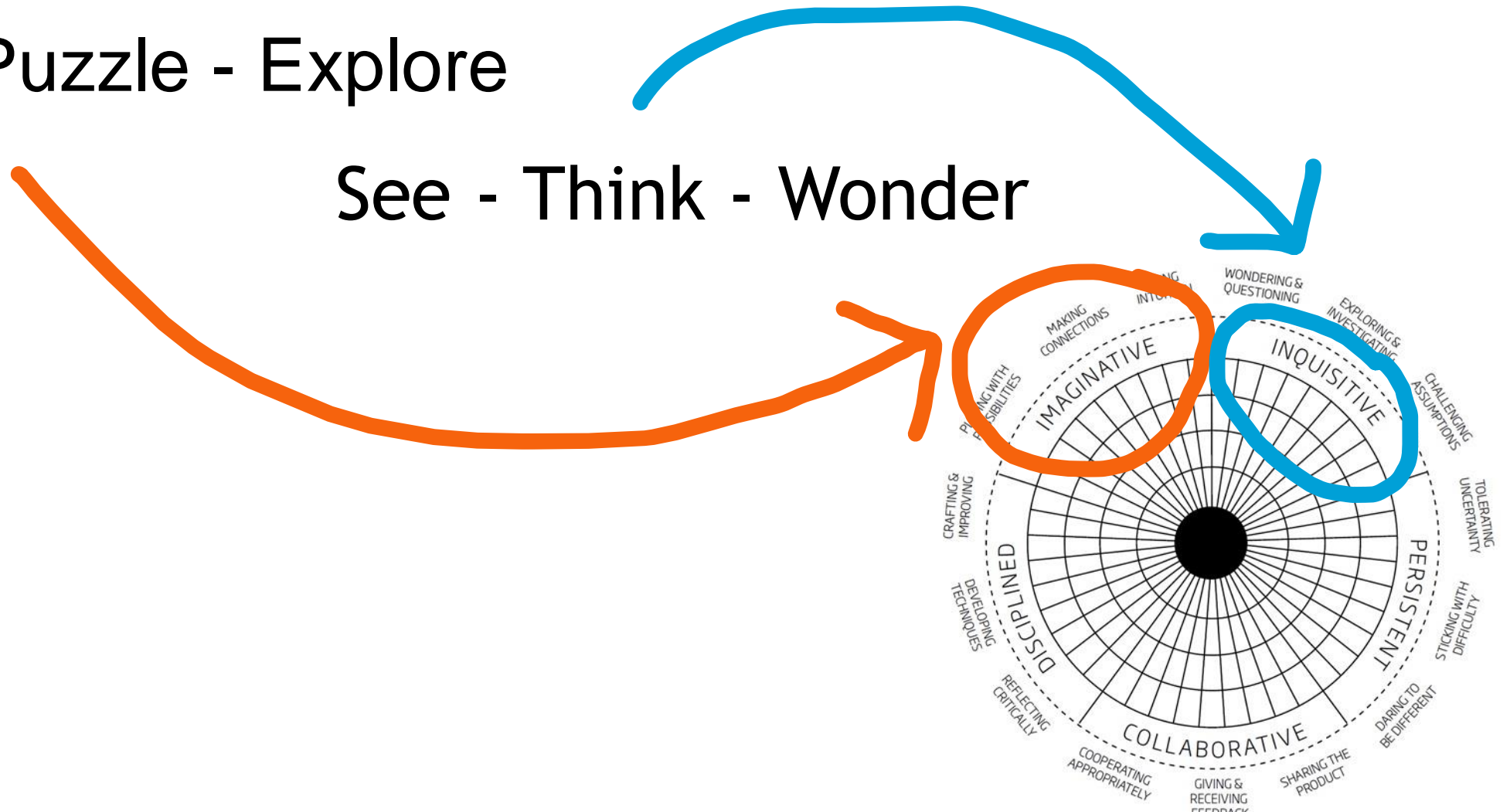I used to Think... Now I think... *A routine for reflecting on how and why our thinking has changed*

See Think Wonder *A routine for exploring works of art and other interesting things*

Compass Points *A routine for examining propositions*

Thinking routines for being imaginative or inquisitive

Think - Puzzle - Explore

See - Think - Wonder

Making the Five Habits visible and tangible

Decoding the 'big' words and putting those words and their alternatives to ideas is powerful; but making ideas into things that students can see and touch is a wonderful way of making the five habits come alive. Here are some ideas for making that happen.

Year One

Ideas developed by creative practitioner Claire Davenhall at Ellenbrook Christian College

1. Threading together and measuring the habits

Call out the names and count the colours of the five habits. Get the students to make clay beads with their hands, rolling them into small round smooth spheres and pushing bamboo skewers through them to make holes. It's great if students focus (persistence and discipline) and are given time to develop ways to craft and improve the beads so they're around the same size and shape. Get the students to colour the beads in each of the five creative habits colours (red/orange, green, navy, yellow and purple) by dipping them into watered-down acrylic paint. Give each student a jar to personalise. At the end of each week, students add their beads to these jars, according to the relevant colour/habit. It means they can track their learning and make it visible in the classroom.

Claire says:

Everyone made at least eight beads, but some had made 12, others 16, and some had made 20. We talked about how some people had rushed them and had to go back and fix them up when they went wonky; how some people had taken their time to perfect the shape; and how some people had found it challenging, but that as a group everyone had made enough beads to paint them the following week. The children loved how the paint felt on their hands, and they worked collaboratively. It was interesting to hear the Year One children using such big words like collaborative and inquisitive.

PRINCIPLE 4

Use signature pedagogies
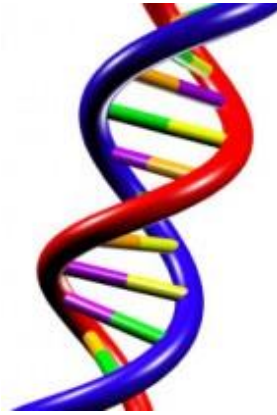
Lee Shulman (2005) Signature pedagogies in the professions. *Daedelus*, 134, 52-59

Playful Experimentation

13. Possibility Thinking

14. Process mapping

15. Meditation

Problem-based Learning

1. Questioning techniques

2. Mantle of the Expert
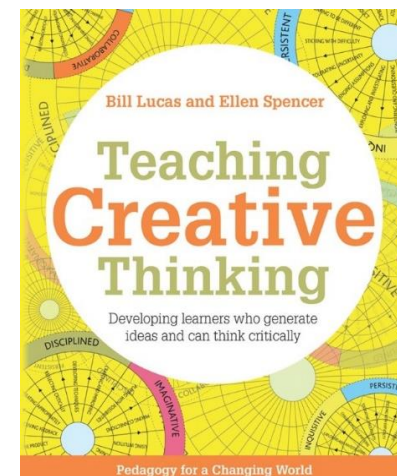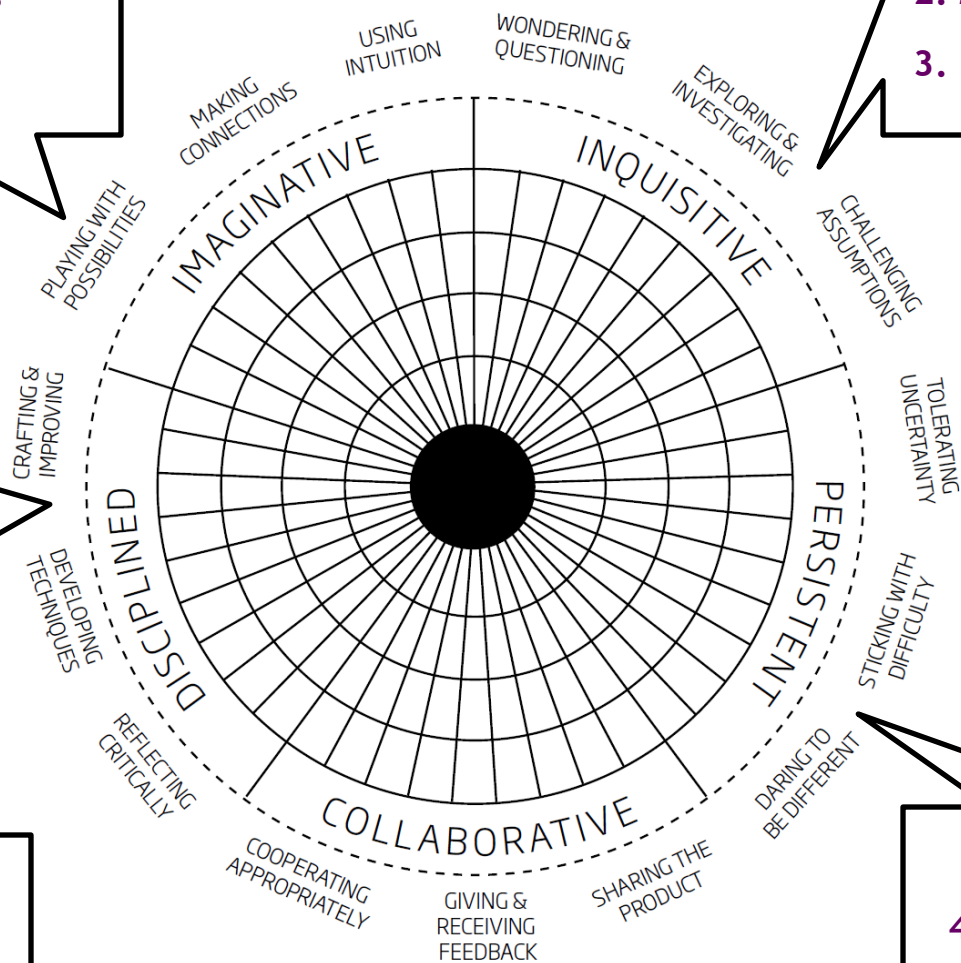
3. Philosophy for Children

Deliberate Practice

10. Drafting

11. Expert demonstration

12. Student feedback
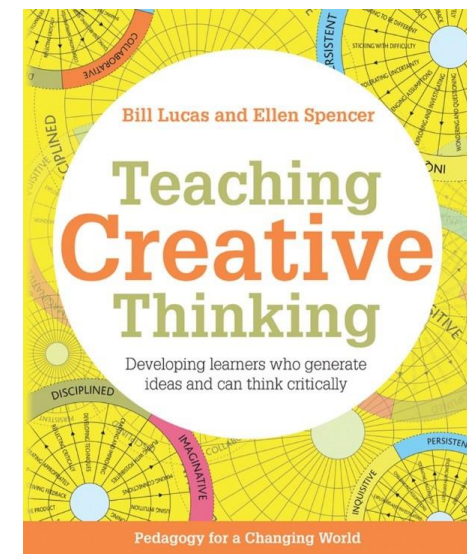
Classroom as Learning Community

7. Group working

8. Peer teaching

9. Authentic assessment

Growth mindset

4. Role play and simulation

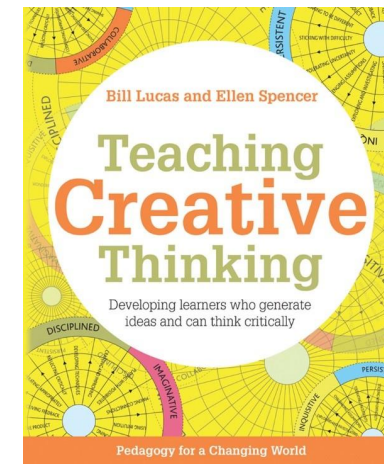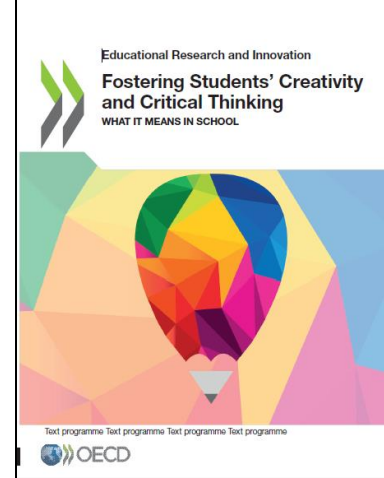**5.** Reframing

6. Perspective taking

case studies
problem-based learning
thinking routines
philosophy for children
role play
games
deep questions
teacher modelling
authentic tasks
thinking out loud
peer teaching
coaching
self-managed projects
enquiry-led teaching

Educational Research and Innovation

Fostering Students' Creativity and Critical Thinking
WHAT IT MEANS IN SCHOOL

Text programme Text programme Text programme Text programme

OECD

Bill Lucas and Ellen Spencer

Teaching
Creative
Thinking

Developing learners who generate
ideas and can think critically

Pedagogy for a Changing World
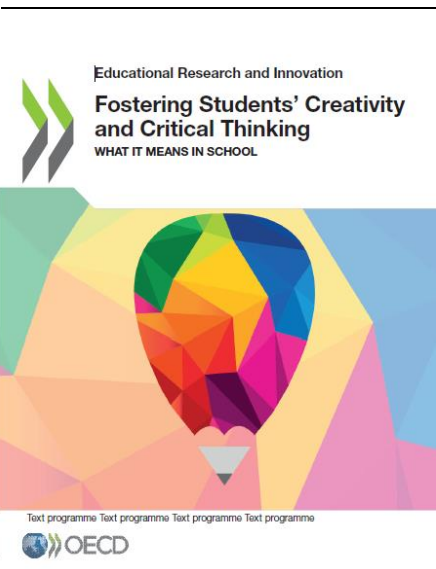
[How to assess it]

Evidencing dispositions like creativity

Pupil	Teacher	Real-world	Online
Real-time feedback	Criterion-referenced grading	Expert reviews	Apps
Photographs	Structured progress interviews	Gallery critique	Digital badges
Self-report questionnaires	Performance tasks	Authentic tests eg	E-portfolios
Logs/diaries/ journals	Capstone projects	displays	
Portfolios		presentations,	
		interviews	
		podcasts	
		films	
		Exhibitions	

Draft Rethinking Assessment Learner Profile

RETHINKING ASSESSMENT

Harriet Smith

I am a Year 13 student who has a passion for science and is looking to study engineering at university...

My Portfolio

This is me...

My Interests

Science	Photography
Digital	Running
Psychology	Nature

THE 3Cs OF SUCCESS

CREATIVE THINKING — Curiosity, Imagination, Problem Solving
COLLABORATION — Emotional Intelligence, Teamwork, Adaptability
COMMUNICATION — Expression, Language, Empathy

ME AS A LEARNER

What are my strengths?
I like to play with things – to break them down and build them up. Whether that's ideas or physical things. So I like taking apart mobile phones and seeing how they work. I think my real strength is being able to see the detail and how it links to the big picture.

What do I want to change about my community / the world?
Girls in my area have very little sport they can do. There are plenty of sports aimed at boys but far less for girls. In the last five months I have got together with my friends to campaign for change and to make the case to the local council.

What do I need to work on?
I find it hard sometimes to work in a team. I am so keen to get on with things i get frustrated with those who want to slow things down. So I am working hard and making sure everyone inlcuding me has a defined role that they can get on with.

What motivates me?
My younger brother has learning difficulties and from a young age I've supported him. I can see how he struggles and that he is not always understood. This has given me a passion for doing something meaningful in my life that helps others overcome difficulties.

BUILDING BLOCKS
- Literacy
- Numeracy
- Digital Skills
- Oracy

COURSES

MAJOR COURSES
- Biology
- Physics
- Design

MINOR COURSES
- French
- Coding

APPLIED COURSES
- Cooking
- Football coaching
- Real world project at advertising company

INTERDISCIPLINARY COURSES
- Climate change
- Migration

PERSONAL PROJECT
My Extended Project Qualification (EPQ) was to build a drone that could deliver medicines to those who need emergency supplies.

Read more

TESTIMONIALS
"Harriet did a real world learning placement with us for 6 months and showed what a great problem solver she is. She was so skilled at breaking down a project into the parts that really mattered and working systematically through them to achieve a high quality outcome. "
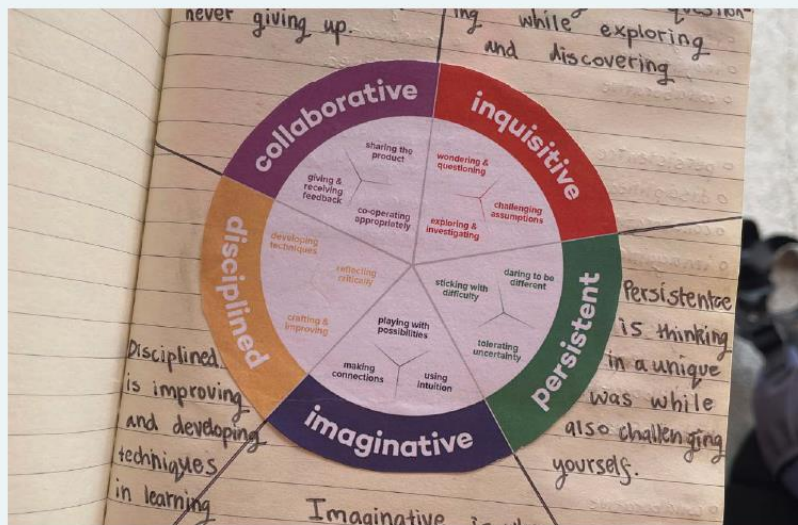
Jenny Tibor, head of product development

salesforce

MY BEAUTIFUL WORK

MY ACHIEVEMENTS
- Duke of Edinburgh Bronze
- Lamda Drama Award
- Church Youth Leader

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02 CSE LEADING EDUCATION SERIES
APRIL 2021

Rethinking assessment in education: The case for change

BILL LUCAS

RA RETHINKING ASSESSMENT

CSE CENTRE FOR STRATEGIC EDUCATION
Leading educational thinking and practice

Student self-report questionnaires

Description

A self-report questionnaire is a series of statements or questions which students use to self-rate.

Benefits include:

- Encouraging self-awareness
- Promoting agency
- Being able to track development
- Inviting support from peers and their teacher.
- Developing student agency.

How to

Typically self-report questionnaires might be framed as 'can do' statements or learners might be given alternative words to choose such as 'never', 'sometimes', 'often', 'always' to describe the degree to which a course of action is truly confident or 'not at all', 'quite', 'very', 'extremely' to describe their degree of confidence with regard to a particular activity.

Another way of developing these is to produce a statement such as 'I always keep going when I get stuck' and ask children to say whether it is 'like me' or 'not like me'. If this is represented graphically it is possible to have a sliding scale to enable pupils to show progress. Self-reports like these can be a useful tool in helping pupils start to use and understand language to describe their progress. On their own they are neither valid nor reliable, but set against other measures such as teacher's observations they can be very useful.
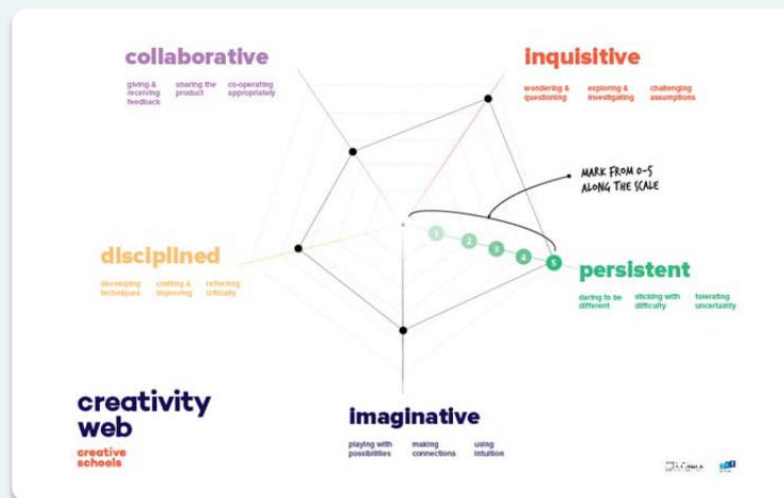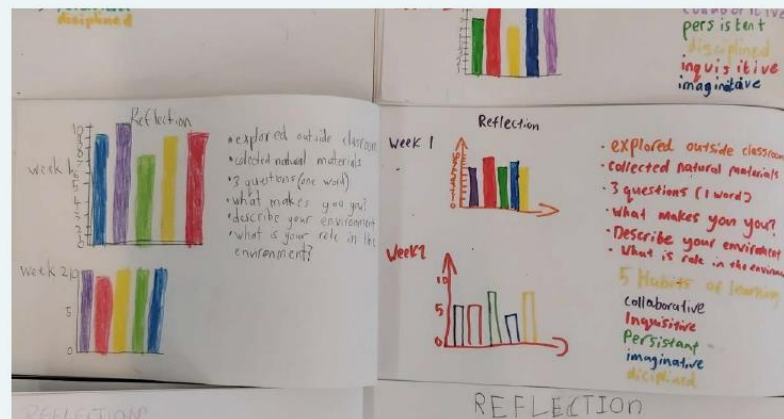

Figure 13. Visualising the development of creative thinking.

Schools may want to use or adapt a self-report questionnaire based on the five creative habits model, Appendix 2.
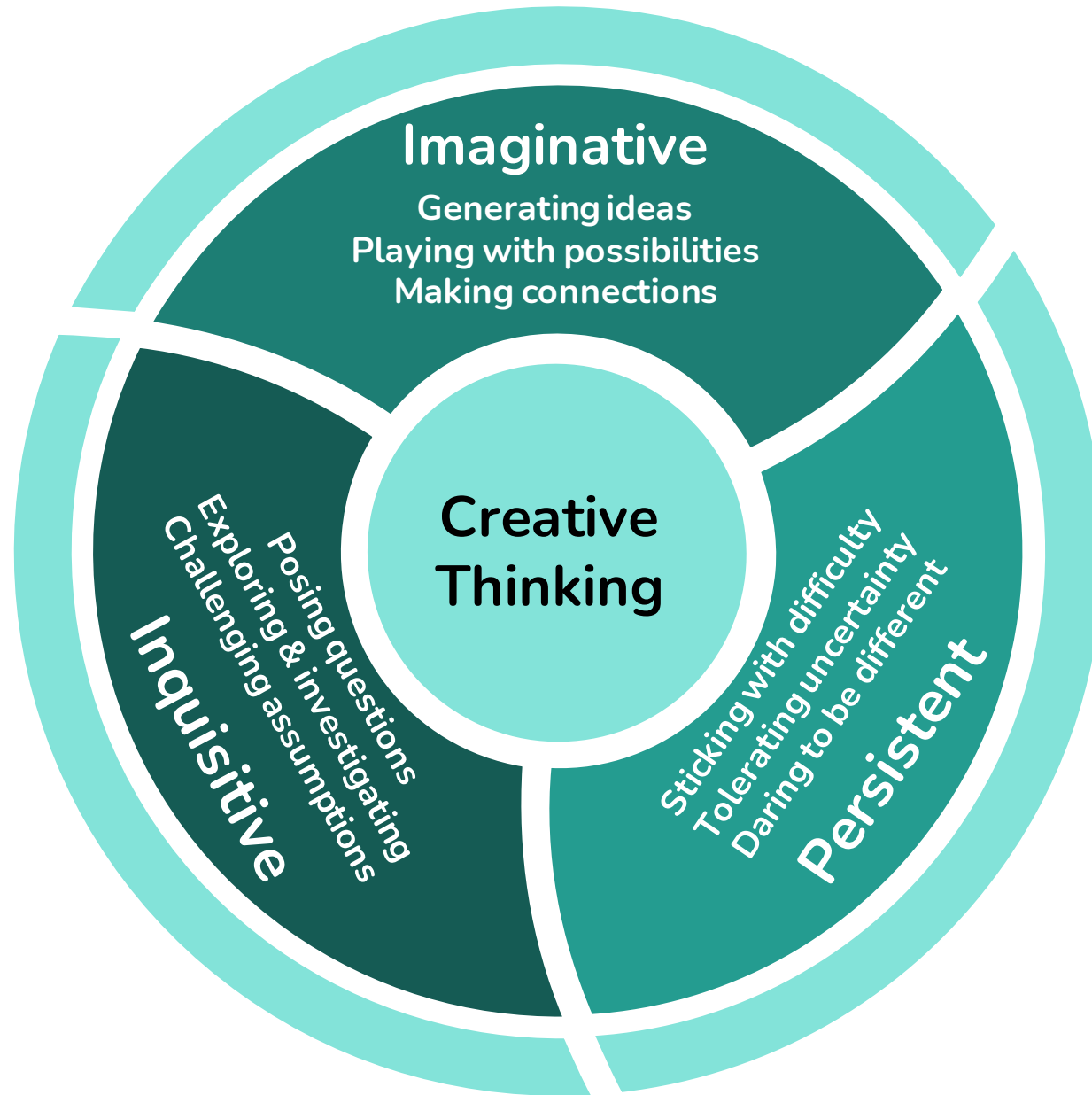

FORM.
building a state of creativity

A field guide to assessing

creative thinking in schools

Bill Lucas

RA RETHINKING ASSESSMENT   creative schools

Creative Thinking progression

	Starting point	Emerging	Developing	Deepening	Key indicators
1. Imaginative					
1.1 Generating ideas	Learners provide one or two simple/obvious ideas with strong support	Learners provide a small number of relatively obvious ideas with some support	Learners provide many ideas, some well-developed, largely working on their own	Learners generate a large number of ideas, relevant to the context and working independently	**Number/agency**
1.2 Playing with possibilities	Learners provide a very limited range of ideas all focusing on the same theme	Learners' ideas represent a small range of themes and show some exploration of the theme	Learners provide a range of ideas that are distinct from one another and which show genuine exploration of the theme	Learners generate a wide range of alternative ideas and solutions, sometimes adapting existing ideas, sometimes integrating other perspectives	**Range/complexity**
1.3 Making connections	Learners present ideas that are very obvious or conventional only containing concepts with which they are already familiar	Learners present ideas that are mostly obvious or conventional containing a few concepts with which they are not already familiar	Learners present ideas which show some flexibility and willingness to go beyond their existing experiences, combining elements of a task to explore new combinations of ideas	Learners present ideas which show that they can think flexibly going beyond their existing experience or social context, combining elements of a task to allow for novel combinations of ideas	**Novel connections**

The Commission proposes that this new qualification should also be supported by a Digital Learner Profile, a personal online portfolio for every student.

The Commission proposes that this new qualification should also be supported by a Digital Learner Profile, a personal online portfolio for every student. It would include academic qualifications alongside a record of other achievements: video footage of a pupil playing a musical instrument, photographs of projects they have worked on or details of expeditions, volunteering and work experience. A prototype of the digital profile already exists.
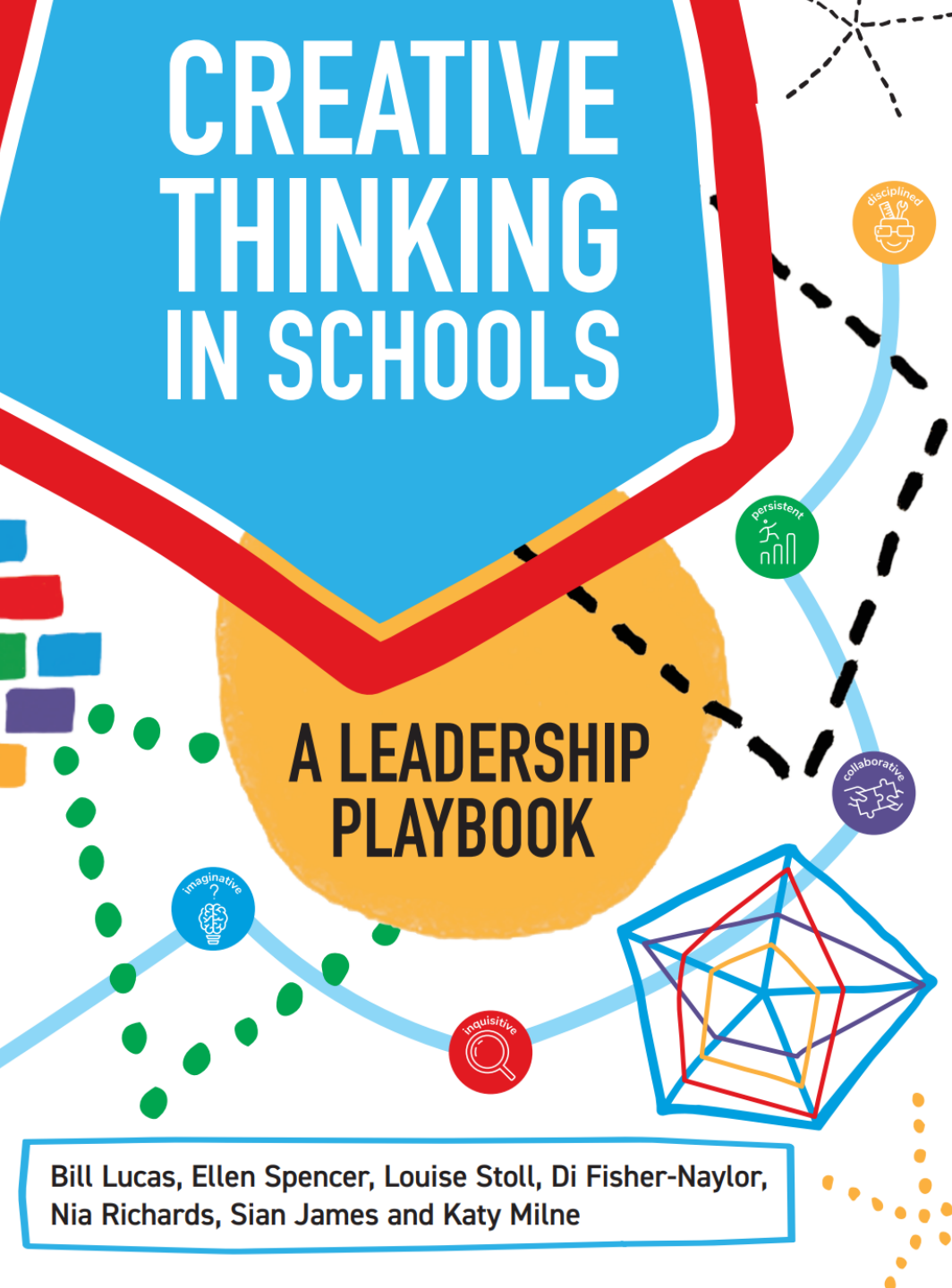
T TIMES Education Commission

40 references to the importance of creativity

BRINGING OUT THE BEST

How to transform education and unleash the potential of every child

CREATIVE THINKING IN SCHOOLS

A LEADERSHIP PLAYBOOK

Bill Lucas, Ellen Spencer, Louise Stoll, Di Fisher-Naylor, Nia Richards, Sian James and Katy Milne

'The Playbook deliberately places emphasis on the creative dimension of leadership, becoming comfortable with openness, offering greater trust, developing spaces for new thinking.

I highly recommend it.'

Dame Prof Alison Peacock

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@LucasLearn @rethinkassessmt

https://rethinkingassessment.com

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