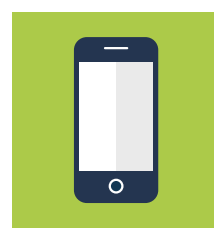
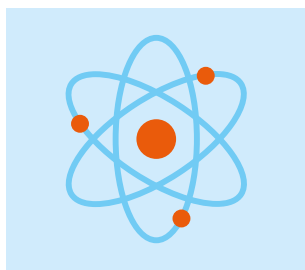
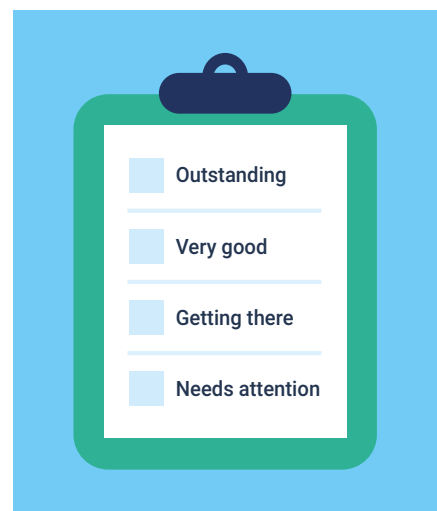
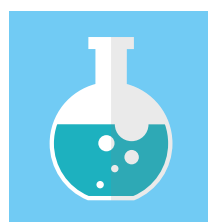
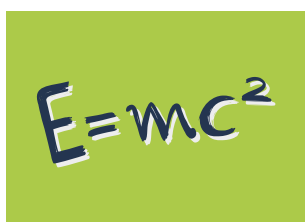
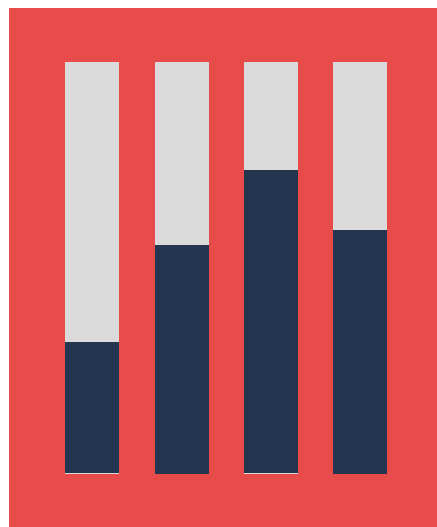
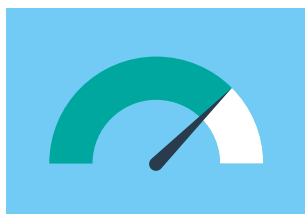


Creative thinking in schools across the world

A snapshot of progress in 2022

BILL LUCAS



About the Global Institute of Creative Thinking

The Global Institute of Creative Thinking (GloCT) is a movement promoting the importance of teaching creative thinking in schools. A UK-based institute, GloCT focuses on encouraging curriculum innovation and reform, providing teacher training and facilitating collaboration and learning through public dialogue and exchange of ideas between schools, governments, and employers in the UK, China and beyond. GloCT's mission is to ensure that all young people have opportunities to develop their creative thinking skills at school and so better prepare them to thrive in the future.

About this report

This progress report is the first of a series to be produced by GloCT. While interest in creative thinking in schools is clearly growing across the world, detailed understanding of its implementation in educational jurisdictions and, most importantly, in schools is hard to come by. Drawing on a range of published materials and on the insights of existing networks of schools and researchers engaged in creative thinking, the report offers a snapshot of where we are today. It is designed to stimulate thinking and encourage teachers, researchers and policy-makers to share their insights with us at GloCT and more widely.

About the author

Professor Bill Lucas is Director of the Centre for Real-World Learning (CRL) at the University of Winchester in the UK. He is also co-founder of a new movement in the UK, Rethinking Assessment, and the curator of the online platform – Creativity Exchange. The five dimensional model of creativity he developed with colleagues at CRL is used in more than 30 countries across the world. Between 2015 and 2019 Bill served on the scientific advisory board of a major research project into fostering students' creativity and critical thinking undertaken by the the Organisation for Economic Co-operation and Development (OECD). In 2017 Bill was appointed by the OECD as co-chair of the strategic advisory group for the 2022 PISA Creative Thinking Test. Bill was co-author of the first report of the Durham Commission on Creativity in Education, published in 2019. In 2020 Bill undertook a review of national frameworks for embedding creativity in schools for the European Joint Research Council. Recently his research has focused on the leadership of creativity, publishing *Creative leadership to develop creativity and creative thinking in English schools: A review of the evidence* with Ellen Spencer and Louise Stoll in 2021.

Bill is chair of GloCT's advisory board.

Acknowledgments

This report could not have been written without the insights and critical friendships of many scholars and practitioners. These include professors Louise Stoll and Michael Anderson who reviewed an earlier draft; Ellen Spencer, Di Fisher-Naylor, Paul Collard and CCE colleagues; Lamis Sabra and the FORM team; colleagues in Australia – Michelle Anderson, Chris Cawsey, Sharon Foster and Tony Mackay; Stéphan Vincent-Lancrin, Michael Stevenson, Mario Piacentini and Natalie Foster at the OECD and, in the UK, educators working with the Durham Commission, Arts Council England, Creativity Collaboratives and the Comino Foundation.

Indications of progress

Throughout the report dashboard icons are used to indicate progress in embedding creative thinking in schools. Red indicates very little, amber a moderate amount and green suggests that there are very encouraging signs of progress.



To cite the report please use:

Lucas, B. (2022). *Creative thinking in schools across the world: A snapshot of progress in 2022*. London: Global Institute of Creative Thinking.



CONTENTS

Foreword	1
1. Introduction	2
Creative thinking at a tipping point – from the 3Rs to the 3Cs	2
2. A brief history of creative thinking in schools	4
From early definitions to practical models	4
Some key developments along the way	4
A model of creative thinking specifically designed for schools	6
Recent advances in understanding	7
Snapshot of the status of creative thinking in schools in school systems	8
3. Progress of creative thinking in international, national and state curricula	9
A growing global consensus on the importance of creative thinking	9
United Nations International Children’s Emergency Fund	9
United Nations Educational, Scientific and Cultural Organisation	9
Organisation for Economic Co-operation and Development	9
Center for Curriculum Redesign	10
World Economic Forum	10
International Baccalaureate	10
Increased emphasis on creative thinking at the national level	10
Creative thinking across the world by selected countries	12
Australia	12
Brazil	14
Canada	14
China	16
England	16
Finland	17
Iceland	18
India	18
Ireland	19
Korea	20
Latvia	20
New Zealand	20
Norway	21
Portugal	21
Scotland	22
Singapore	22
Sweden	23
Wales	23
Multi-country comparisons	23
A surprising omission – USA	24
Snapshot of creative thinking in curricula across the world	24

4. Culture, curriculum design and pedagogies for creative thinking	25
Conducive cultures for creativity	25
Principles of curriculum design for creative thinking	26
1. Problem-based and extended in length	27
2. A social act	27
3. Interdisciplinary	27
4. Co-designed with students	28
Principles of pedagogy for creative thinking	28
A world of possibilities	28
A world of inevitable uncertainties	30
Signature pedagogies for creative thinking	31
Intentional and systematic not accidental and opportunistic	32
Snapshot of culture, curriculum design and pedagogies for creative thinking globally	33
5. Assessing and evidencing progression in creative thinking	34
Why assess creative thinking?	34
1. Improving the status of creative thinking	34
2. Enhancing the quality of teaching and learning	34
3. Promoting a shared understanding of creative thinking	35
Shifting perspectives on assessment globally	35
Innovation in assessing creative thinking	36
Challenges in evidencing creative thinking	38
Snapshot of the assessment of creative thinking	38
6. The state of professional learning for creative thinking	39
Effective professional learning in schools	39
The scale of the challenge	39
Fragments of good practice	40
Initial and pre-service teacher training	41
Snapshot of the state of professional learning for creative thinking in schools	41
7. Creative thinking in schools – an agenda for change	42
Next steps	42
Snapshots of progress	43
The status of creative thinking	43
Curricula	43
Culture, curriculum design and pedagogies	43
Assessment	43
Professional learning	43
Appendix 1	44
Appendix 2	46
Appendix 3	48
References	49

FOREWORD FROM ANDREAS SCHLEICHER

In a world in which the things that are easy to teach and test have also become easy to digitise and automate, the capacity of individuals to imagine, to create and to build things of intrinsic worth is rising in importance.

Schools today need to prepare students for a period of extraordinarily rapid economic and social change, for jobs that haven't been created, to use technologies that haven't yet been invented, and to solve social problems that we can't yet imagine. People need to be able to imagine new solutions, to connect the dots between things that previously seemed unconnected, and to see new possibilities and turn them into new products or ways of living.

All this makes creative thinking so vital. And creative thinking can reinforce a host of other individual capabilities, including metacognitive capacities, inter-personal and problem-solving skills, as well as promote identity development, academic achievement, future career success and social engagement.

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. Over the last decade there have also been encouraging attempts to assess creativity in schools, looking to evidence progress in the development of creative skills.

This year, for the first time, the Organisation for Economic Cooperation and Development (OECD) Programme for International Assessment (PISA) will test the creative thinking of 15-year-old students in an international comparative setting. In selecting creative thinking as the focus of its new test, the OECD is

explicitly seeking to raise the status of this important human competence.

However, despite these efforts, teachers tend to find it difficult to teach creativity. What is missing is not the curricular goal, but effective pedagogies that translate the curricular goal of creative thinking into instructional practice. This is where "A global overview of creative thinking in schools" by Bill Lucas makes such a difference. The report offers exciting examples of creative curricula from educational jurisdictions across the world that provide powerful evidence of the importance attached to creativity and creative thinking, together with effective ways to put this into practice. The examples give confidence in understanding the pedagogies which can enable teachers to embed creative thinking in every discipline of the curriculum.

I also strongly applaud the contribution which the Global Institute of Creative Thinking (GloCT) makes to working with schools, researchers and policy-makers to create an international movement that promotes the teaching of creative thinking in schools.

I hope that this report will stimulate continued innovation in practice, research and policy to help educate the next generation for their future, not our past.

Andreas Schleicher

**Director for Education and Skills,
and Special Advisor on Education
Policy to the Secretary-General at the
Organisation for Economic Cooperation
and Development (OECD)**

1. INTRODUCTION



Creativity now is as important in education as literacy, and we should treat it with the same status.

Sir Ken Robinson¹

Creativity and creative thinking are now seen as areas of scholarship in their own right with a number of respected journals and academic centres spread across the world. The idea that creativity involves, in its broadest sense, a combination of novelty and value, including a consideration of the context in which it takes place, is now widely accepted as the 'standard' definition (Plucker et al., 2004).

While homo sapiens has always had to rely on the ability to generate ideas and fresh thinking to survive and thrive, it is arguable that two events in the 1950s in the USA were landmarks along the way to a recognition of the importance of the field. The first was a speech by Joy Paul Guilford as the new president of the American Psychological Association in September 1950 where he argued for the value of creativity to society and the need for more formal research into a previously partially understood field (Guilford, 1950). In particular Guilford extolled two kinds of creative thinking – convergent (coming up with one good idea) and divergent (generating multiple solutions). Divergent thinking, he argued, is at the heart of creativity.

The second key event was the launch of the satellite Sputnik 1 by the Soviet Union in October 1957. Americans could not believe that their know-how had been trumped by the Russians in a race to be first into space. This demonstration of superior technology was taken as an indictment of the education systems of the USA and Europe and was attributed to their lack of creativity.

As we consider the increasing interest in creative thinking in schools across the world it is important to remember that the cultures of different countries have a significant impact on the way

that people define and develop creative thinking. Shao et al., (2019) remind us, for example, of the different value the East and the West place on novelty and usefulness:

Individuals from different cultures, particularly those from individualist and collectivist cultures, show differences in preferred creative processes and creative processing modes (e.g., usefulness seems more important than novelty in the East, whereas novelty seems equally important as usefulness, if not more so, in the West) when they are engaged in creative endeavors. (p.1)

As you read this report, please remember that it is only a snapshot of progress with creative thinking in schools. It is offered to encourage discussion with all those who work in and with schools across the world. Necessarily it is incomplete and has omissions which can be included in subsequent iterations. The Global Institute of Creative Thinking will be systematically tracking the kinds of developments that are described in these pages and will publish updates of progress probably on a bi-annual basis.

Creative thinking at a tipping point – from the 3Rs to the 3Cs

In the last few decades there has been a sea-change in thinking about the value of creativity in schools. Across the world educational jurisdictions, the countries and states that set policy for schools, are changing their view of what schools should be teaching.

For nearly two centuries teachers have focused very largely on core literacies, what have become known as the 3Rs,

1 TED talk, 2007, Do schools kill creativity? <https://www.youtube.com/watch?v=iG9CE55wbY>

Reading, wRiting and aRithmetic. Today there is a growing belief that it is time to recognise the additional skills and dispositions needed for our complex world. Synthesising research over the last two decades (Lucas, 2019), we might like to think of these newer foundational 'literacies' as the 3Cs of Communication, Collaboration and Creative thinking².

If policy is changing, the confidence to put this into practice in schools has been slower to materialise. In part this is because the idea of creative thinking has become unhelpfully polarised, with 'culture warriors' on both sides of an argument falsely pitting dispositions or competences against subject knowledge. Countries which value traditional discipline-based teaching above everything else tend to distrust something like creativity or creative thinking which seems new and too pervasive to fit into a subject-based national curriculum. They see it as somehow undermining knowledge. By contrast those jurisdictions which are overtly seeking to use education as a means of gaining global competitive advantage or which take a more holistic view of education tend to view creative thinking as an essential part of what school students need to develop.

Research suggests that embedding creative thinking in schools is not an alternative to more traditional approaches but a complement to them; subject disciplines and real-world contexts both matter. The skill of educational leaders and teachers is to be more intentional, interleaving creative thinking into every aspect of school life.

2 As will be seen from later in this document researchers have proposed 4Cs, 6Cs and 7Cs in an attempt to reframe the curriculum

2. A BRIEF HISTORY OF CREATIVE THINKING IN SCHOOLS



Creativity is as much a habit in and an attitude toward life as it is a matter of ability.

Robert Sternberg (2017, p.376)

In the 1960s and for much of the second part of the twentieth century one individual, Ellis Paul Torrance, was particularly influential in arguing for the importance of creativity in schools in the USA. Torrance (1969) defined creativity as:

...the process of sensing problems or gaps in information, forming ideas or hypotheses, testing and modifying these hypotheses, and communicating the results. (p. 3–4)

That the field of creativity in education scholarship is still vibrant in the USA is to an extent a legacy of Torrance's influence in connecting creativity with learning so powerfully in American education³.

From early definitions to practical models

Torrance's definition of creativity is one of many, some abstract and others more applicable for use in schools. It raises four key issues for any school leader trying to embed creative thinking in their school.

1. If this is the definition what is the model? (Compare creative thinking, say, with the English language which can be broken down into reading, writing, speaking and listening, has parts of speech, and has grammar and rules, albeit often broken.)
2. If this is the definition what's the syllabus?
3. If this is the definition, what does progression from age 4 to age 19 look like as pupils' creativity

becomes stronger, broader and deeper?

4. And, even if there are good answers to the three questions above, how does creative thinking fit within a school timetable that is organised by subject disciplines?

A lack of answers to these four questions has significantly hampered the systematic introduction of creativity into schools. That said there have always been creative teachers who have sought to cultivate creative thinking in their students in all subjects.

Some key developments along the way

As the twentieth century was drawing to a close a landmark report was published in the UK by the National Advisory Committee on Creative and Cultural Education, *All Our Futures: Creativity, Culture & Education* (1999), also known as the Robinson Report after its chair, Sir Ken Robinson, whose words begin this section.

The NACCCE report argued that a national strategy for creative and cultural education was essential to the process of providing a motivating education fostering the different talents of all children. NACCCE defined creativity as:

Imaginative activity fashioned so as to produce outcomes that are both original and of value. (p. 30)

It argued for the universality and individuality of creativity:

³ A long and distinguished list includes but is not limited to Teresa Amabile, John Baer, Ron Beghetto, Mihaly Csikszentmihalyi, James Kaufman, Mark Runco, Keith Sawyer, Robert Sternberg

All people have creative abilities and we all have them differently. When individuals find their creative strengths, it can have an enormous impact on self-esteem and on overall achievement. (p. 6)

Notwithstanding this clarion-call for the wide distribution of creative thinking, there were many teachers who still maintained that only a small proportion of individuals could be creative and remained uncertain as to how they could teach pupils to think more creatively. In 2001, creativity researcher Anna Craft made the simple but important suggestion that there are two different kinds of creativity, big c and little c. There is, she argued, a difference between being a creative genius (big c) and an ordinary person who is creative (little c). In schools, she suggested that we should focus on little c creativity.

Between 2002 and 2011 Creative Partnerships, one of the most ambitious schemes for promoting creativity in schools anywhere in the world, was funded by the Arts Council and two government departments in England. The programme worked with some 1 million children and over 90,000 teachers in more than 8,000 projects in England. Creative Partnerships defined creativity very broadly to include, for example, the work of scientists, architects and makers, and also looked beyond education to the issue of employability.

During this period creative thinking found its way into the UK's national curriculum in the shape of Personal Learning and Thinking Skills (PLTS). PLTS marked a significant shift away from curricula dominated by knowledge towards those which also seek to promote wider skills. Developed by the Qualifications and Curriculum

Development Agency (QCDA) and actively used in schools between 2009-2013, the PLTS described six groups of skills one of which was creative thinking skills. Young people who are creative thinkers, QCDA suggested:

- Generate ideas and explore possibilities
- Ask questions to extend their thinking
- Connect their own and others' ideas and experiences in inventive ways
- Question their own and others' assumptions
- Try out alternatives or new solutions and follow ideas through
- Adapt ideas as circumstances change.

During this period in the USA James Kaufman and Ron Beghetto (2009) helpfully built on Craft's idea of big and little c creativity to establish a continuum of four levels:

- mini-c, for example when a child creates something that is not original but is nevertheless new to them
- little-c or everyday creativity, where ideas are used to develop thinking that is of value to others
- pro-c, creativity at a professional level with many years of deliberate practice and training
- big-c, the geniuses we remember in the history books for their leaps of creative imagination.

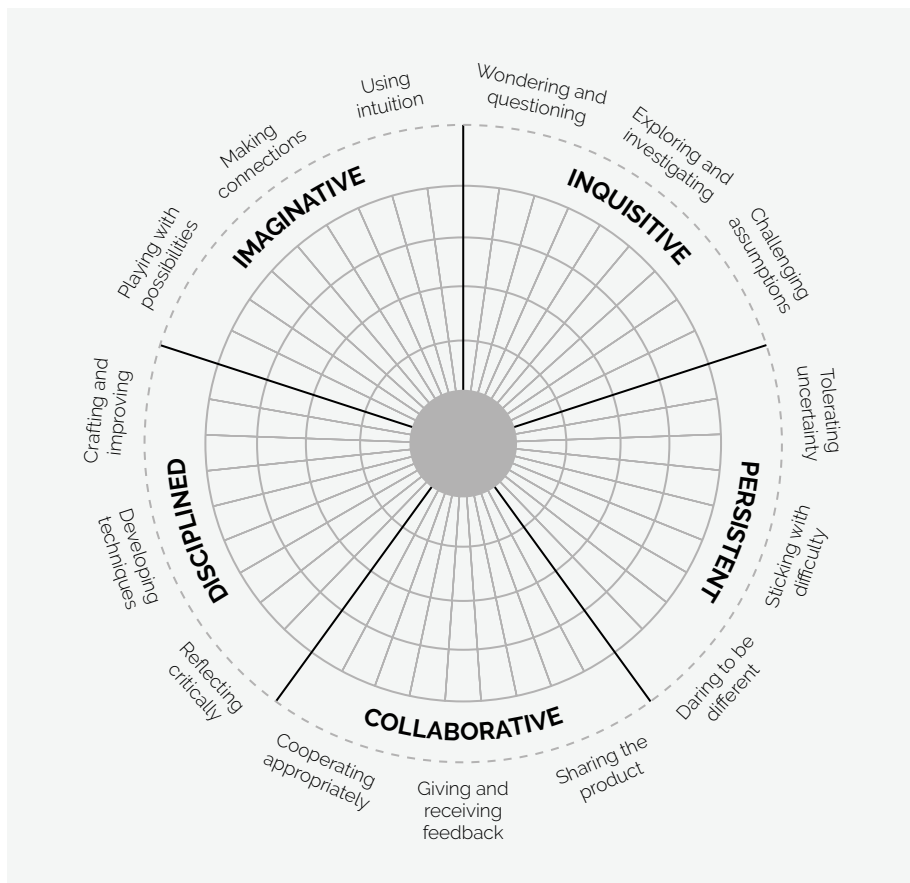
In the Southern hemisphere, a seminal report in 2008 known as the *Melbourne Declaration on Educational Goals for Young Australians*, articulated the need for young Australians to become:

...successful learners, confident and creative individuals, and active and informed citizens (p. 8).



FIGURE 1
Australian's model of Critical and Creative Thinking (2017)

FIGURE 2
A five-dimensional model of creative thinking in schools (Lucas et al. 2013)



The championing of creativity by the Melbourne Declaration led directly to the development by the Australian Curriculum, Assessment and Reporting Authority (ACARA) of an Australian Curriculum in 2010 in which Critical and Creative Thinking is a key general capability (Figure 1).

ACARA's model arguably shifted the debate from broad definitions of creativity or creative thinking to a definition or model explicitly developed for use by schools.

Each of these developments in thinking has helped educators to move from big ideas and broad definitions to considering how they might be implemented in schools. But, with the exception of the impetus given to the field by work in Australia, there was still no widely used model teachers could apply in their schools.

A model of creative thinking specifically designed for schools

One of the world's first models to be researched and developed specifically for schools is the Centre for Real-World Learning's five-dimensional model, in which creativity is made up of five creative habits (Figure 2).

Commissioned by Creativity, Culture and Education in the UK, the Centre for Real-World Learning (CRL) at the University of Winchester researched and trialled a model of creativity which is now used in more than thirty countries across the world. As well as the widely acknowledged aspects of divergent thinking, imagination and inquisitiveness, the model introduces three key creative habits with particular implications for schools:

1. Being persistent, with the implication that this will inevitably require learners to make mistakes along the way.
2. Being collaborative, acknowledging the reality that creative thinking is almost always a group activity in life and at school (where it is rarely recognised, indeed can be seen as cheating).
3. Being disciplined, that it is learnable and requires practice just as is the case in the development of mastery in individual subject disciplines.

The CRL model is complemented by strategies for implementation including leadership (Lucas et al., 2021) and curriculum design and pedagogy (Lucas and Spencer, 2017), see pages 38–44 and **Figure 3**.

Recent advances in understanding

Three other developments are noteworthy – the Durham Commission on Creativity and Education in 2019, research by the OECD published in 2019, and a new test of creative thinking developed by the Programme for International Student Assessment (PISA) and administered in 2022.

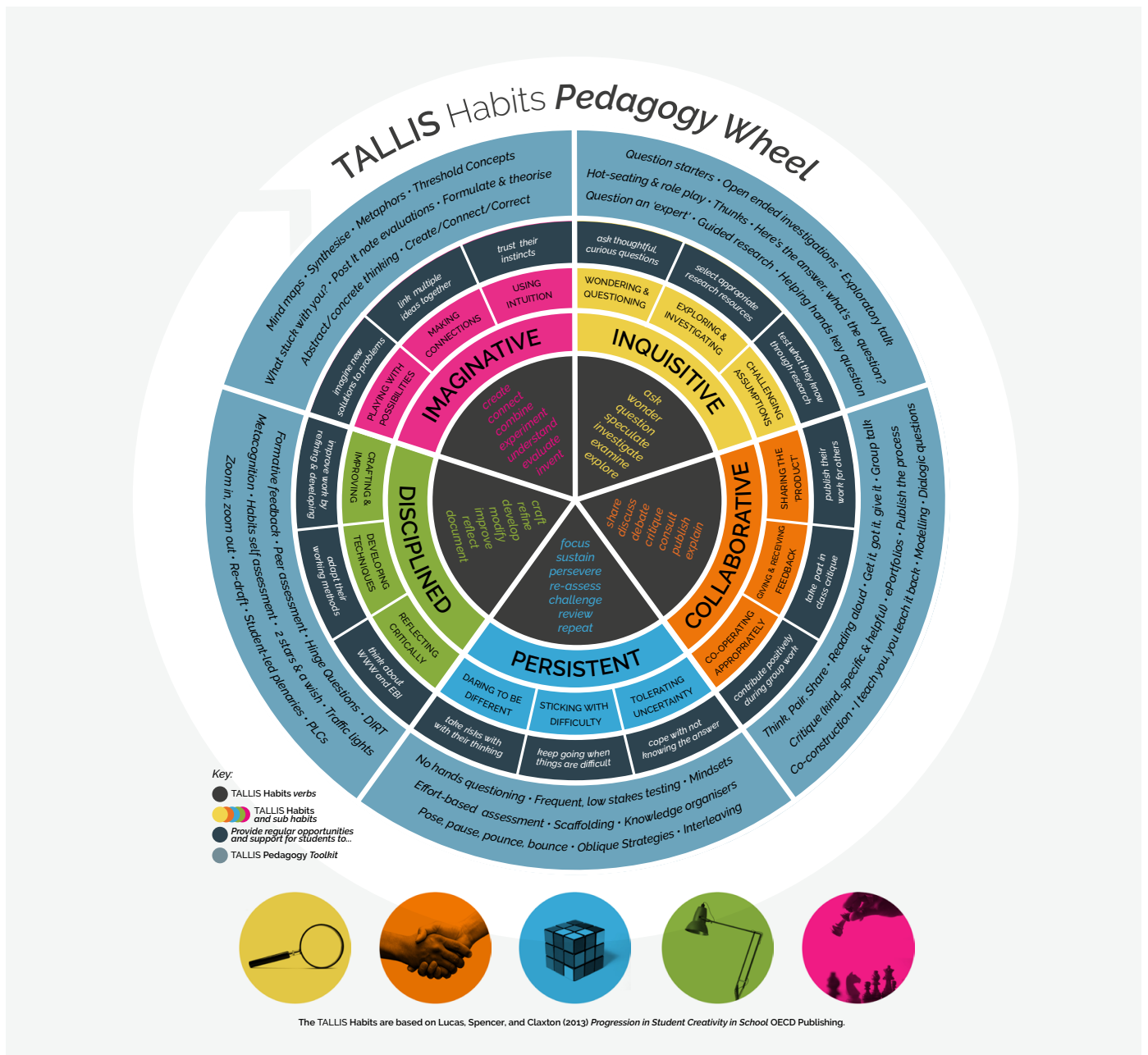
The Durham Commission on Creativity and Education (Durham Commission, 2019) is the first major exploration of the role of creativity in schools since education became a devolved responsibility in England. Of special relevance here is the helpful distinction it draws between creativity as an abstract concept and the processes by which it can be embedded in schools:

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

FIGURE 3

CRL's model as implemented by Thomas Tallis School, London, England⁴



4 Rooty Hill High School in Sydney, Australia has implemented the model with similar attention to pedagogy

TABLE 1

OECD rubric on creativity and critical thinking, (Vincent-Lancrin et al., 2019, p. 23)

	CREATIVITY Coming up with new ideas and solutions	CRITICAL THINKING Questioning and evaluating ideas and solutions
INQUIRING	Make connections to other concepts and knowledge from the same or from other disciplines	Identify and question assumptions and generally accepted ideas or practices
IMAGINING	Generate and play with unusual and radical ideas	Consider several perspectives on a problem based on different assumptions
DOING	Produce, perform or envision a meaningful output that is personally novel	Explain both strengths and limitations of a product, a solution or a theory justified on logical, ethical or aesthetic criteria
REFLECTING	Reflect on the novelty of the solution and of its possible consequences	Reflect on the chosen solution/position relative to possible alternatives

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. (p. 2)

Between 2015 and 2019 the Centre for Educational Research and Innovation (CERI) at the OECD took CERI's five-dimensional model of creative thinking as its starting point for an eleven-country study designed to understand more about how creativity is taught and assessed in schools (Vincent-Lancrin et al., 2019). The study has developed considerable understanding about pedagogies and assessment techniques with regard to creative thinking. A key finding was that models of creativity, however clear, need further translation for the classroom and that rubrics can help with this process:

Rubrics are a way to simplify, translate and construct a social representation of what creativity and critical thinking look like in the teaching and learning process. They aim to create a shared understanding of what creativity means in the classroom, and share expectations among teachers, and among teachers and students. The function of rubrics is to simplify the big concepts of creativity and critical thinking so that they become relevant to teachers and learners in their actual educational activities. (Vincent-Lancrin et al., 2019, p. 21.)

Table 1 is an example of a rubric used with teachers in the OECD-CERI research. It seeks to break down a disposition such as creativity or critical thinking into parts which can be described clearly and unambiguously.

Every three years the Programme for International Student Assessment (PISA) identifies an important fourth new area alongside literacy, maths and science in which to measure performance of 15-year-olds. As part of this process of innovation, PISA developed and administered the first ever global test of creative thinking in 2022.

That creative thinking was the focus of PISA's tests in 2022 (originally scheduled for 2021 but delayed owing to the pandemic) is a powerful indicator of the growing status of creativity in schools. PISA defines creative thinking 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, 2019, p. 8)

The growth of initiatives exploring the assessment of creative thinking is explored in section 4.



Snapshot of the status of creative thinking in schools in school systems

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.

3. PROGRESS OF CREATIVE THINKING IN INTERNATIONAL, NATIONAL AND STATE CURRICULA

Of course, there is no such thing as an international curriculum. But there are international bodies which have, especially in the last two decades, begun to suggest what might be included on it if there were. Creativity and creative thinking are consistently mentioned.

A growing global consensus on the importance of creative thinking

Within global models there is increasing interest in aspects of the curriculum beyond the subject disciplines which have historically formed the bedrock of curricula (Lucas and Venckutė, 2020).

United Nations International Children’s Emergency Fund

The United Nations International Children’s Emergency Fund, or UNICEF as it is better known, sees creative thinking and creativity as one of three core learning skills, **Figure 4**.

United Nations Educational, Scientific and Cultural Organisation

The United Nations Educational, Scientific and Cultural Organisation (UNESCO) has a history of promoting creativity as part of a wider cultural agenda and specifically within education. The UNESCO Creative Cities Network, for example, was created in 2004 to promote cooperation among cities that have identified creativity as a strategic factor for sustainable development. It supports World Creativity and Innovation Day which takes place on 21 April each year, established by the United Nations General Assembly Resolution in 2018 to raise awareness of the importance of creativity and innovation in problem solving with respect to advancing the United Nations sustainable development goals 2030.

In 2014, with the International Bureau of Education UNESCO supported an early publication on the importance of nurturing creative thinking in schools (Kampylis and Berki, 2014) and its series of three papers exploring the Futures of Learning explore aspects of curriculum and pedagogy stressing the importance of schools nurturing students’ creative thinking, (Scott, 2015):

Learners must have opportunities to reflect on their ideas, hone their analytical skills, strengthen their critical and creative thinking capacities, and demonstrate initiative. (p. 17)

Organisation for Economic Co-operation and Development

For some while the Organisation for Economic Co-operation and



Teachers find it challenging to implement a creativity pedagogy because they often lack a lens with which to understand creativity in their classroom.

Dorothea Lasky and Susan Yoon (2020, p. 1)

FIGURE 4
UNICEF core life skills (UNICEF-MENA Regional Office, 2017)



Development (OECD) has argued that the creativity is fundamental to future curricula, specifically to a wider competence it encapsulates by the phrase 'Creating new value', (OECD, 2018):

To prepare for 2030, people should be able to think creatively...The constructs that underpin the competency include adaptability, creativity, curiosity and open-mindedness. (p. 5)

The importance of creative thinking has been constantly reinforced by high-profile statements – speeches, blogs and articles (Foster and Schleicher, 2022) – from Andreas Schleicher, Director for Education and skills at the OECD, as well as through the work of OECD-CERI.

Center for Curriculum Redesign

The US-based Center for Curriculum Redesign has consistently championed the 4Cs⁵ of creativity thinking, critical thinking, communication and

collaboration in its global curriculum framework, relating these not just to 'knowledge' and character' but also to metacognition, (Fadel, 2009) (Figure 5).

World Economic Forum

A widely cited framework from the World Economic Forum visualises the relationship between foundational literacies, competencies – where it locates critical thinking and creativity – and character qualities, Figure 6.

The World Economic Forum's model aligns closely with the one developed by the Center for Curriculum Redesign.

International Baccalaureate

Independent of any national curriculum the International Baccalaureate (IB) has led the way in thinking beyond subject disciplines since its formation in 1968 in Geneva and now has schools in 160 countries. The IB has for a long while championed trans-disciplinarity and advocated the importance of creativity⁷:

...we believe every person has the ability, and the right, to be creative. By providing IB students with the tools to encourage creative thought and creative behaviours, our programmes help students to develop creativity and, in turn, to foster a commitment to lifelong learning. Creativity is a key element of all four IB programmes.

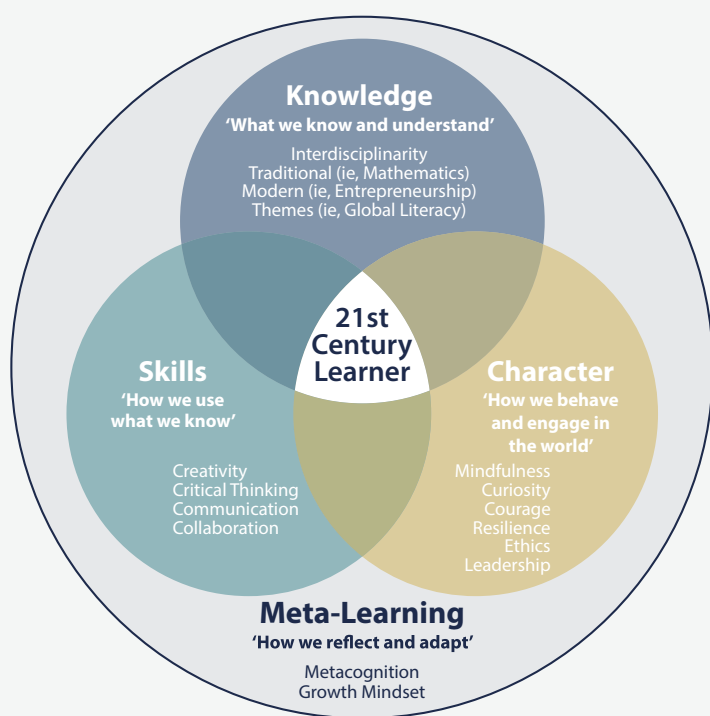
The IB reminds us that the idea of curriculum is a global as well as a national or state-wide phenomenon.

Increased emphasis on creative thinking at the national level

Since 1990s a number of reviews have been undertaken with regard to the inclusion in national curricula of creative thinking. O'Donnell and colleagues (2002) looked at the curriculum documents of 16 developed countries

FIGURE 5

Center for Curriculum Redesign model of curriculum⁶



© Center for Curriculum Redesign

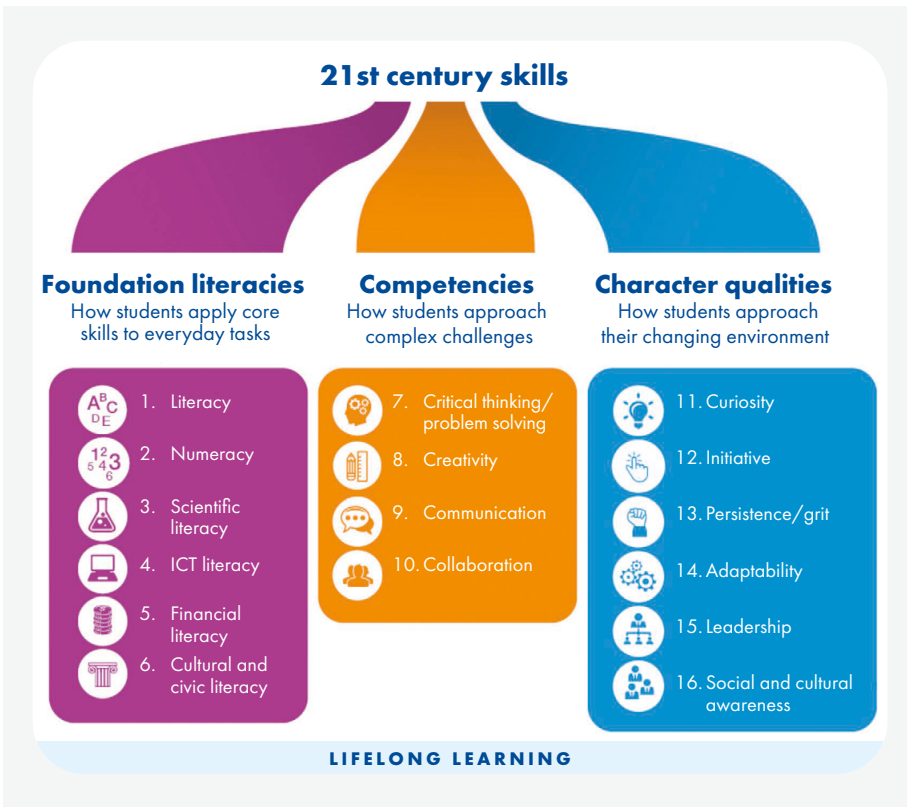
5 See also Claxton and Lucas (2015) 7Cs – Confidence, Curiosity, Collaboration, Communication, Creativity, Commitment, Craftmanship

6 <https://curriculumredesign.org/framework/>

7 <https://www.ibo.org/programmes/teach-more-than-one-ib-programme/creativity-in-ib-programmes/>

FIGURE 6

Creativity and critical thinking as a competency (World Economic Forum, 2015)



identifying the place of arts and creativity in education. They found that creativity was included in aspects of the curriculum, for example, in Canada (as creative thinking), in Kentucky, USA, to enable students to use creative thinking skills to develop or invent novel, constructive ideas or products, in Korea, and in Australia where a goal of education is for students to become successful learners, confident and creative individuals.

Researchers at the Brookings Institution in the USA have been tracking the spread across the world of skills like Creative Thinking for a number of years. In 2018, in a study of 152 countries, Brookings revealed the degree to which curricula are changing, beginning to focus on areas such as creative thinking (Care and Kim, 2018). The four most frequently identified 'wider' skills or dispositions in national policy documents can be seen in Figure 7, with creativity mentioned in more than 60:

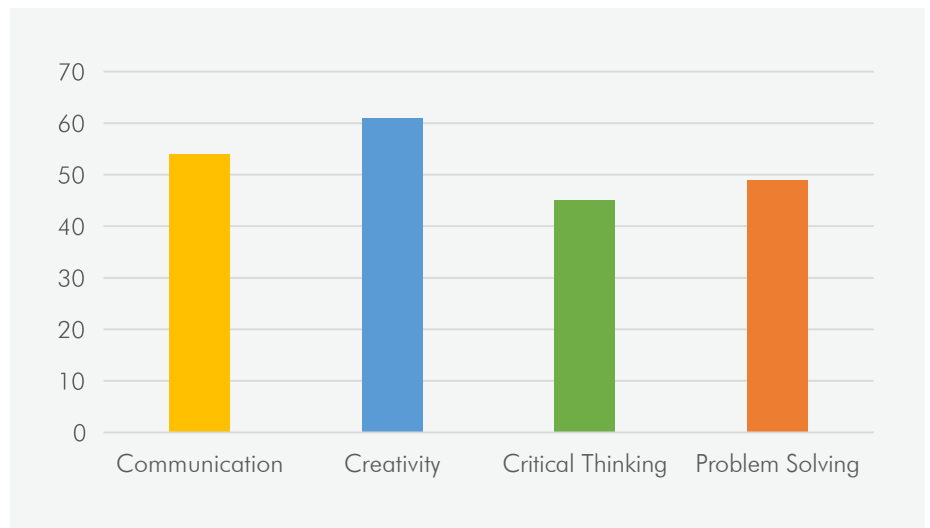
A further study using the Center for Curriculum Redesign classification (p. 13) looked at 22 educational jurisdictions (countries or states) of which 21 now explicitly mention creativity/critical thinking. The key Brookings finding here is that, while creative thinking may be on the educational agenda, guidance is as yet

lacking on pedagogy and assessment, see Table 2 on page 12.

In terms of specific jurisdictions researchers identified 6 which were making significant progress in embedding creative thinking (creativity/critical thinking) – Australia, British Columbia (Canada), Singapore, Finland, Hong Kong (China) and Victoria (Australia). progress

The Centre for Strategic Education CSE and Center for Curriculum Redesign have gone one stage further and developed a way of ranking countries according to the degree to which their national curricula focus on

FIGURE 7
Most often mentioned wider skills (Care et al., 2018, p.10)



	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

TABLE 2

The prevalence of the 4Cs in national/state curricula, (Taylor et al., 2020)

competences like creative thinking (Fadel, 2021). As the report’s main author, Charles Fadel reminds us that the rankings are only an approximation of any kind of rank order as definitions of creativity thinking vary across the world. So too does the availability of data. Nevertheless, the table below provides interesting food for thought (Table 3).

While there is some overlap in the countries featured in the following pages, there are also considerable differences. Fadel himself caveats his own index of countries by suggesting that he has written a discussion not a research paper:

The authors fully and openly recognise the methodological challenges – in conceptualisation, in data sources, in construction and in establishing validity. This paper does not claim to have resolved those challenges. (p. 2)

Creative thinking across the world by selected countries

The vignettes which follow offer an alphabetical snapshot of progress by country, but are by no means an exhaustive list.

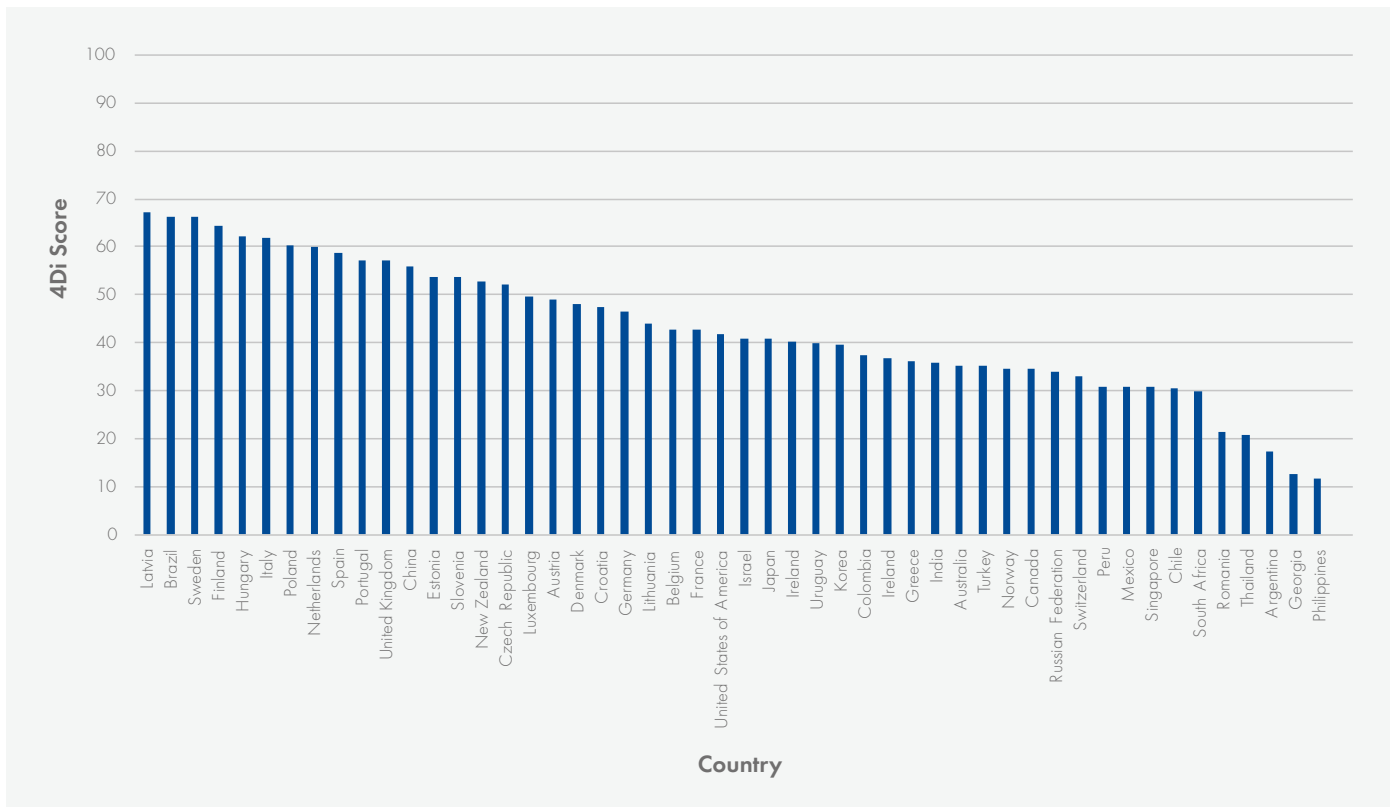
Australia

Australia has led the world in prioritising and defining creative thinking (critical and creative thinking) as we saw in Figure 1 on page 6. As well as providing a clarity of definition, the Australian Curriculum, Assessment and Reporting Authority has mapped progression according to the four aspects of creative thinking:

1. Inquiring – identifying, exploring and organising information and ideas
2. Generating ideas, possibilities and actions
3. Analysing, synthesising and evaluating reasoning and procedures

TABLE 3

An index of progress in embedding creativity across the world (Fadel, 2021, p. 8)



4. Reflecting on thinking and processes.

Appendix 1 shows the development of creative thinking between the Foundation year and year 10.

Critical and creative thinking is seen as one of seven general capabilities which intersect and connect with subjects or learning areas, **Figure 8**.

Miranda Jefferson and Michael Anderson (2017, 2021) have developed learning frameworks that they refer to as 'coherence makers' for creativity and other areas of learning. 4C Transformative Learning⁸ uses these frameworks in partnership with more than 80 early childcare centres, primary (elementary), secondary and tertiary education settings in Australia and internationally.

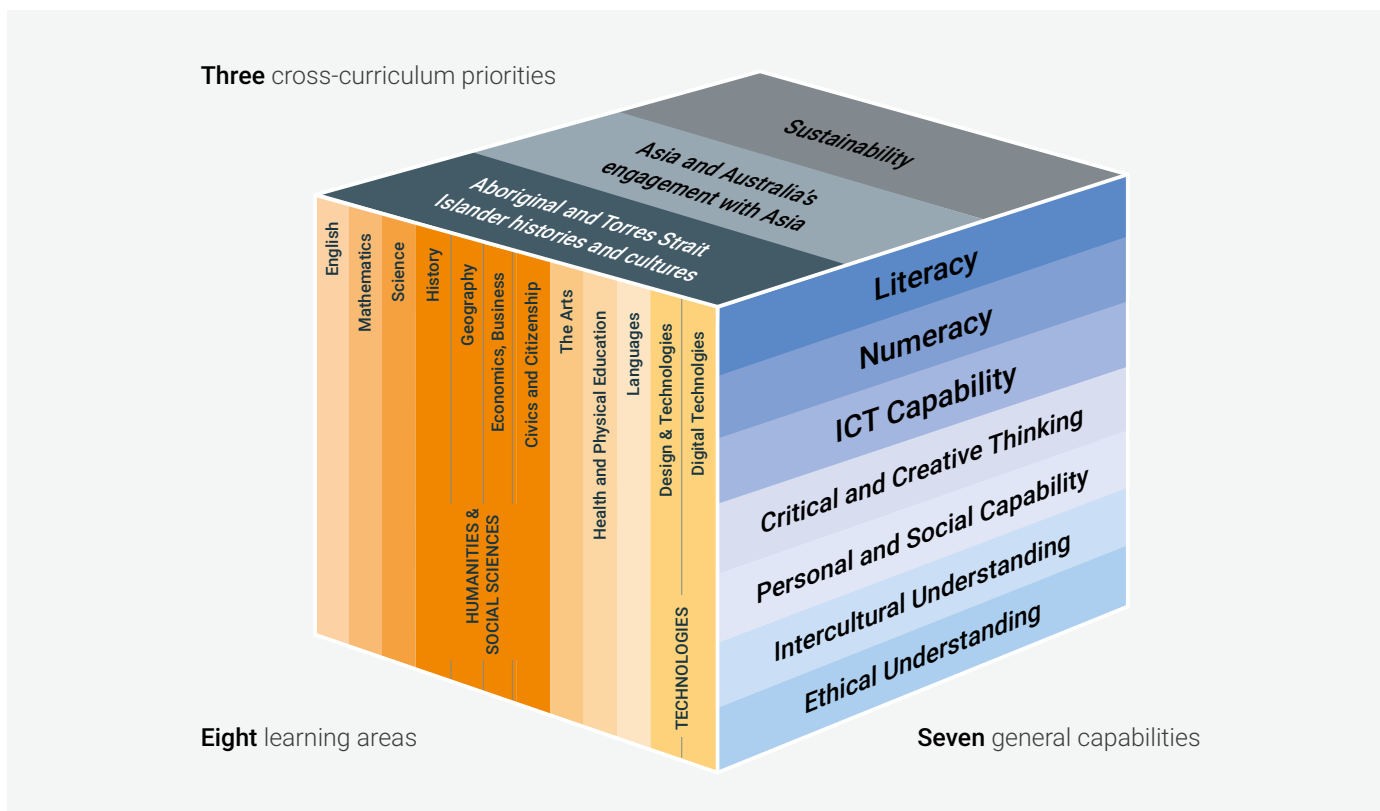
The delivery of the Australian curriculum is devolved to individual states. Examples of innovative practice include Victoria and Western Australia. In Victoria the Victorian Curriculum and Assessment Authority (VCAA)

has led the world in simplifying the idea of critical and creative thinking (CCT), developing its own continuum of learning for CCT, curating resources for planning and teaching CCT⁹, and, a world first, developing online tests of CCT¹⁰ given to fifteen-year-old students. **Figure 9** is an example of one of the engaging, scenario-based online assessment developed by VCAA.

Appendix 2 contains VCAA's continuum for CCT as well as its attempts to define standards at each of five two-year periods.

In Western Australia, led by cultural organisation FORM, schools have been working with Creativity, Culture and Education and the author of this report for a number of years. Creative Schools is a learning programme developed by FORM using creative teaching and learning strategies to cultivate student agency. It seeks to engage students in deep learning within the Western Australian curriculum explicitly connecting with the Australian general capabilities and the Centre for Real-World Learning's five habits of

FIGURE 8
The Australian Curriculum



8 <https://www.4ctransformativlearning.org/>

9 <https://www.vcaa.vic.edu.au/curriculum/foundation-10/resources/criticalandcreativethinking>

10 <https://www.vcaa.vic.edu.au/curriculum/foundation-10/resources/criticalandcreativethinking/assessmentresources/Pages/default.aspx>

CRITICAL AND CREATIVE THINKING

ID: XZ4R45

Moon Landing - Critical and Creative Thinking Assessment

Level 9, 10 2716 VIEWS ● Copy Only



FIGURE 9

An example of a VCAA online assessment

creative learning – being imaginative, inquisitive, collaborative, persistent and self-disciplined¹¹. FORM publishes a range of resources for schools including, most recently, *A field guide to assessing creative thinking in schools* (Lucas, 2021).

Brazil

Introduced in 2017, the Brazilian National Common Curricular Base (BNCC) is designed around ten competencies at primary education level, one of which is, broadly speaking, creative thinking (UNESCO, 2018):

To exercise intellectual curiosity and to resort to original approaches in sciences, including research, reflection, critical analysis, imagination and creativity; investigate causes, elaborate and test hypothesis, formulate and solve problems and create solutions (including technological ones) based on the knowledge from different areas. (p. 16)

Brazil was a participant in the OECD-CERI Creativity and Critical Thinking research project. Teachers and students in the state of Catarina focused

on professional development for teachers and the use of student self-assessment rubrics based on the OECD framework. In the review by Charles Fadel of countries' competencies Brazil features as one of the highest-ranking countries, though this was not possible to verify from publicly available documents in English for this snapshot of progress.

Canada

In 2016 the Canadian Ministry of Education identified six global competencies to guide education – critical thinking and problem solving, innovation, creativity, and entrepreneurship, learning to learn/ self-awareness and self-direction, collaboration, communication, and global citizenship and sustainability (Figure 10).

The delivery of the curriculum is devolved to individual states in Canada. Examples of innovative practice include Alberta, British Columbia and Ontario.

In Alberta the state has mapped the creative thinking competence (a combination of critical thinking and creativity and innovation) across the

¹¹ <https://www.creativeschools.com.au/>



content of all subjects in the curriculum. It also provides many resources to help teachers understand what creative thinking looks like on the ground, giving practical examples and expressing these in first person statements from a student's perspective (Alberta Ministry of Education, 2016), **Figure 11**.

Within the overarching Canadian competence framework, British Columbia has developed sophisticated thinking about the relationships between school and lifelong learning, surface and deep learning, and competences and subject disciplines. The curriculum has three core competences – Communication, Thinking and Personal and Social. Creative thinking sits within Thinking as a sub-competence.

Each sub-competence has three or four facets. Each sub-competency has a set of six profiles, descriptors of students' sub-competency development emphasising the concept of expanding and growing¹². Each sub-competence is accompanied by illustrations, examples of how students from diverse backgrounds and communities have demonstrated their developing competence.

Creative thinking has three facets – creating and innovating, generating and incubating and evaluating and developing and is clearly defined:

Creative Thinking involves the generation of ideas and concepts that are novel and innovative in the context in which they are generated, reflection on their value to the individual or others, and the development of chosen ideas and concepts from thought to reality.

People who think creatively are curious and open-minded, have a sense of wonder and joy in learning, demonstrate a willingness to think divergently, and are comfortable with complexity. A creative thinker reflects on existing ideas and concepts; uses imagination, inventiveness, resourcefulness, and flexibility; and is willing to take risks to go beyond existing knowledge.¹³

British Columbia provides extensive resources for integrating, teaching and assessing progress in creative thinking.

Ontario, like Alberta and British Columbia, has been developing competence-based approaches for

12 <https://curriculum.gov.bc.ca/competencies#unpacking>

13 <https://curriculum.gov.bc.ca/competencies/thinking/creative-thinking>

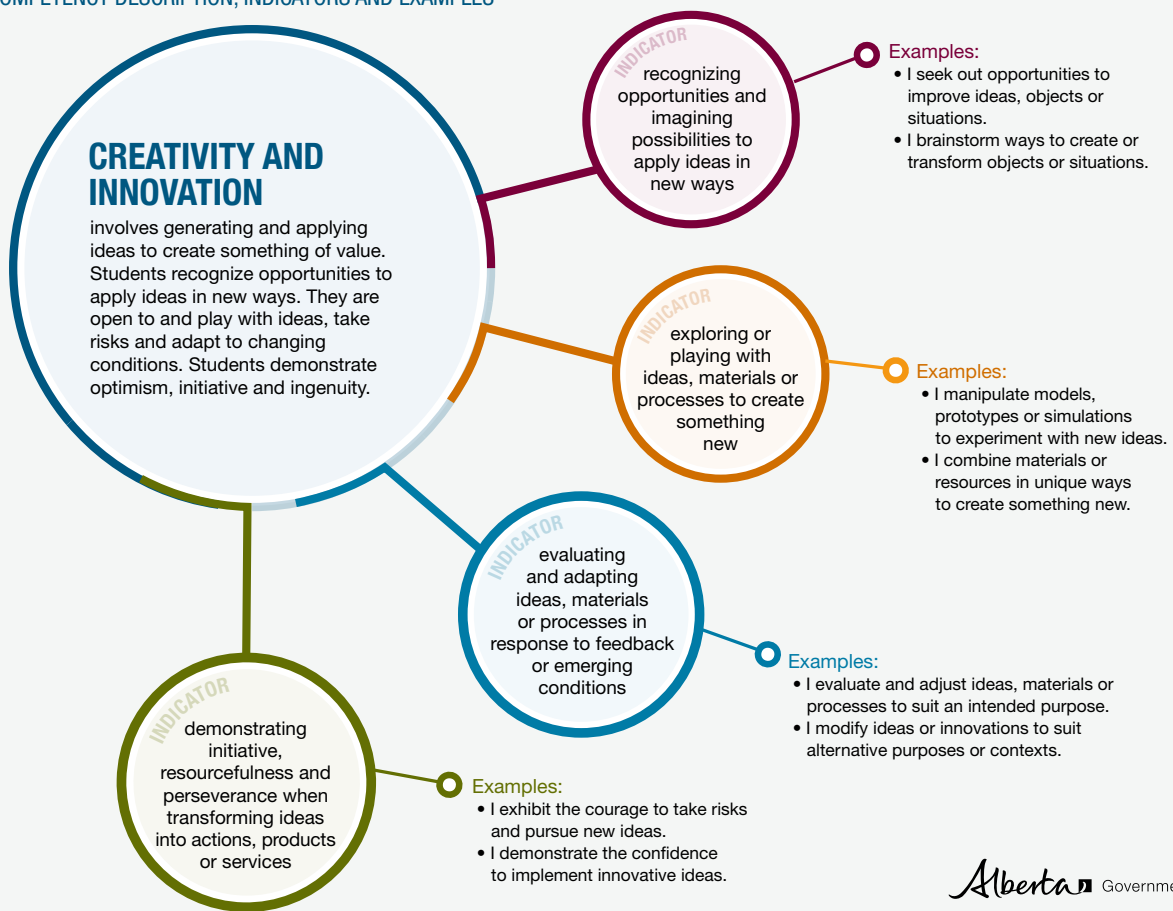


FIGURE 11
Alberta’s Competency Description for Creativity and Innovation

several years. Framed as twenty-first century competences, these are critical thinking and problem solving, innovation, creativity and entrepreneurship, learning to learn/self-awareness and self-direction, collaboration, communication, and global citizenship and sustainability. In parallel to these Ontario has drawn heavily on Michael Fullan’s deeper learning framework (Fullan and Scott, 2014) and its 6Cs of character, citizenship, collaboration, communication, creativity and critical thinking.

China

China’s Education Modernization 2035 plan sets the direction for the development of the education sector so that its overall capacity and international influence are strengthened. It emphasises the cultivation of high-order competences such as innovative ability (creative thinking), critical thinking, civic literacy, cooperation and communication skills, self-development literacy and information

literacy, etc. China believes that only by strengthening the cultivation of these qualities can it enhance the international competitiveness of Chinese students.

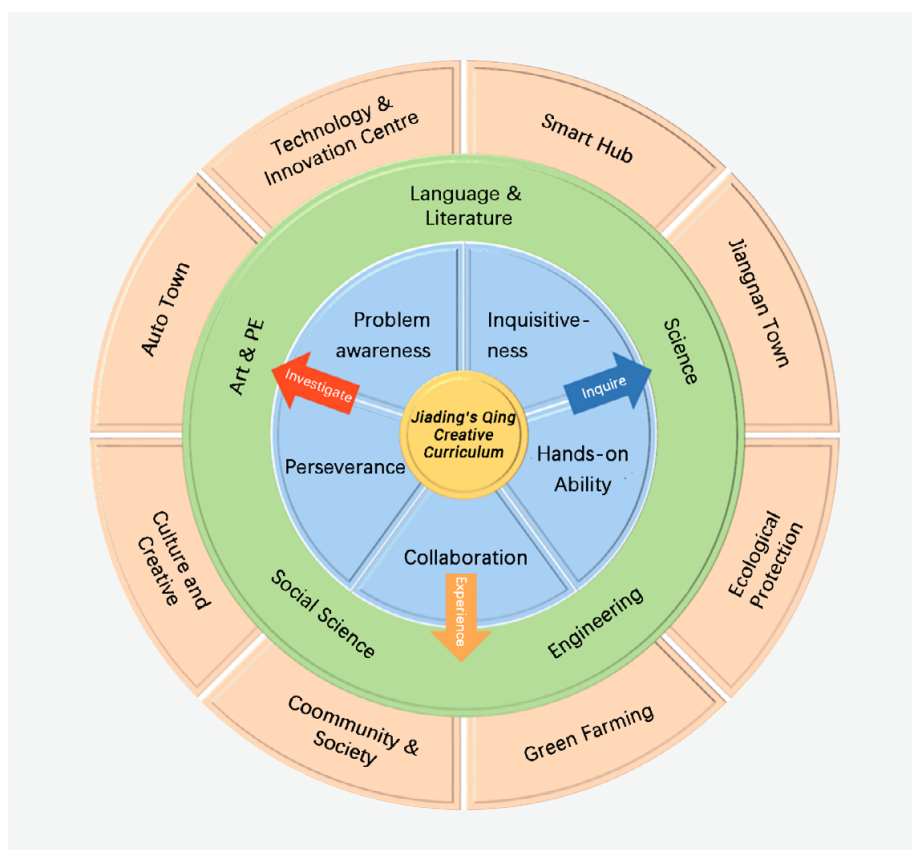
Recently schools in two districts of Shanghai – Jiading and Pudong – have developed a Creative Lab that draws inspiration from the five-dimensional model developed by the Centre for Real-World Learning in England. The project has involved schools identifying a specific theme with regional characteristics, for example the automotive or maritime industries, constructing a curriculum, designing problem-based learning modules, mapping the five-dimensional model against the curriculum, encouraging students to generate creative solutions or products as the result of their learning and developing rubrics to assess their progress, **Figure 12**.

England

Between 2010 when the Personal, Learning and Thinking Skills stopped being promoted by the Department

FIGURE 12

Jiading's Creative Compass that draws inspiration from Lucas et al., 2013



of Education and 2019 when the Durham Commission on Creativity and Education was published, creative thinking has been largely invisible in the English National Curriculum.

Since 2021, stimulated by the Durham Commission's recommendations, there has been significant activity. Eight Creativity Collaboratives, clusters of 8–12 schools, have been funded for three years to embed creative thinking in their curriculum and beyond. The Creativity Collaboratives programme will build networks of schools to test innovative practices in teaching for creativity, sharing learnings to facilitate system-wide change. Working alongside existing school structures, teachers and educators will co-develop creative strategy and pedagogy, test out approaches to teaching and learning, and evaluate their impact on pupils, schools and communities.

Also in 2021 a new online platform, Creativity Exchange¹⁴, was created, 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 school¹⁵. A number of initiatives and individuals in this report have already been featured on it.

Finland

Finland, a consistently a high performing education system, introduced a new national curriculum in 2014. Subjects such as mathematics, environmental studies, biology, geography, physics, and health education sit side by side with transversal, cross-cutting skills and capabilities needed in many subject disciplines and for success in life,

Figure 13.

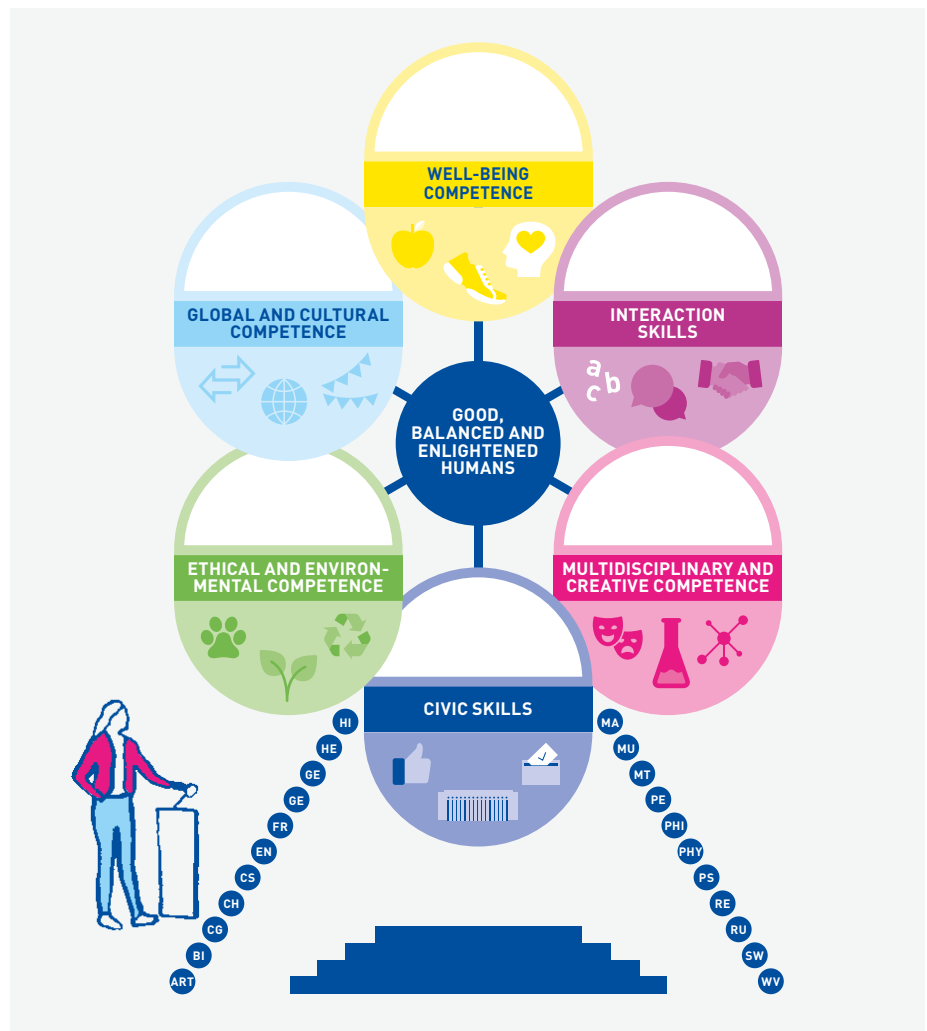
One particularly innovative development is the decision to require Finnish schools to teach at least one module a year which is inter-disciplinary. This simple strategy both requires and enables teachers to work in ways which are likely to foster creativity. In Finland the approach used is referred to as phenomenal learning and has

¹⁴ <https://www.creativityexchange.org.uk/>

¹⁵ <https://www.creativityexchange.org.uk/>

FIGURE 13

Transversal competences in Finnish general upper secondary education



been featured on the HundrEd global innovation website¹⁶.

Indeed, creativity and multidisciplinary learning are linked together in one competence:

Multidisciplinary and creative competence

- Curiosity and motivation to learn; to find meanings and to combine things in new ways
- Self-regulated learning, factual criticism, development of learning-to-learn skills
- Multiliteracy in the digital era.¹⁷

Iceland

Innovation Education was introduced in the 1990s as a deliberate attempt to promote creativity in schools. Today creativity is one of six 'pillars

of education' (Icelandic Ministry of Education, Science and Culture, 2014).

Creativity is based on curiosity, challenge, excitement and search. Grappling the problem and finding a solution can, in itself, be the reward of creation. Creativity disrupts traditional patterns, rules and systems and shows phenomena and received ideas in a different light. (p. 22)

India

India's National Education Policy 2020 represents a fundamental shift in policy on earlier thinking, **Figure 14**.

In a radical departure from a more didactic approach, in the new Indian curriculum:

16 <https://hundred.org/en/innovations/2-creative-classroom-phenomenal-learning-from-finland>

17 <https://www.oph.fi/en/education-and-qualifications/transversal-competences-finnish-general-upper-secondary-education>

...curriculum content will be reduced in each subject to its core essentials, to make space for critical thinking and more holistic, inquiry-based, discovery-based, discussion-based, and analysis-based learning. The mandated content will focus on key concepts, ideas, applications, and problem-solving. Teaching and learning will be conducted in a more interactive manner; questions will be encouraged, and classroom sessions will regularly contain more fun, creative, collaborative, and exploratory activities for students for deeper and more experiential learning. (p. 12)

It specifically stresses the importance of 'creativity and critical thinking to encourage logical decision-making and innovation' (Ministry of Human Resource Development, 2020, p. 5).

Ireland

Since 2017 an all-of-government culture and wellbeing programme, Creative Ireland, seeks to inspire and transform people, places and communities through creativity.

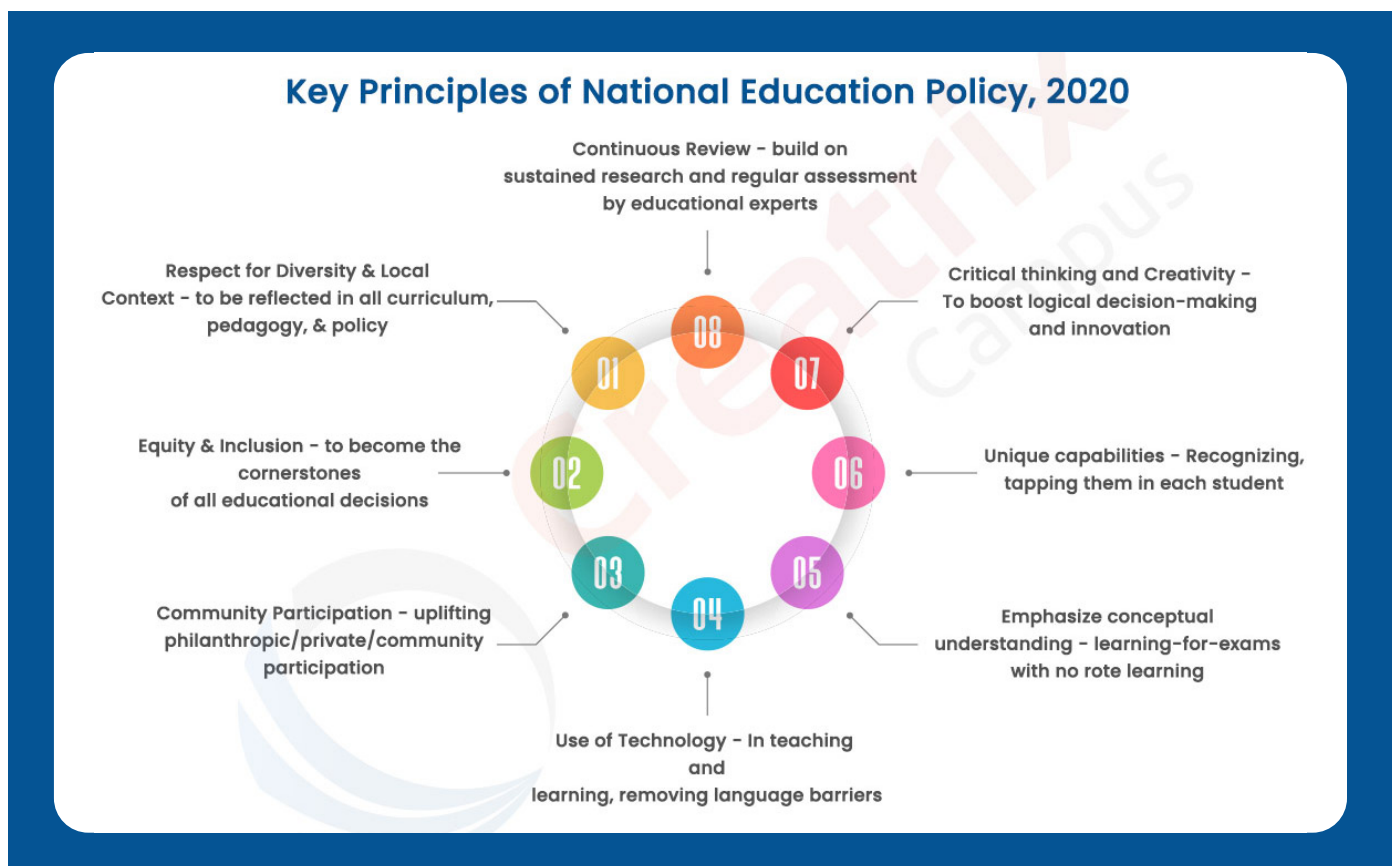
The vision of the Creative Ireland Programmes is of a country where creativity is at the heart of public policy; where everyone has the opportunity to realise their full creative potential; an Ireland where participation in cultural and creative opportunity promotes the wellbeing of the individual, the community and the nation at large. (Creative Ireland, 2019, p. 1)

The Creative Schools programme¹⁸ aims to:

...give our children and young people the opportunity to experience creativity as an integral part of their education.

Significant progress has been made with more than 460 schools participating in the initiative, each supported by a Creative Associate who co-designs a bespoke school plan for embedding creativity in the life of the school and supported by Creativity, Culture and Education.

FIGURE 14 Key features of India's National Education Policy 2022



18 <https://www.creativeireland.gov.ie/en/creative-youth/creative-schools/>

Korea

Korean refers to 'raising a creative person' as one of the most important goals of education in the reform of the national curriculum recently (Choi, et al., 2011). An example of this is the establishment in 2009 of 'Creative experiential learning activities' at both primary and secondary levels primary and secondary levels (Ministry of Education, Science and Technology, 2010) and the introduction in 2016 of an 'exam-free semester' in middle school to lend space to more creative pursuits. The importance attached to creativity can be seen in **Figure 15** (Korea Institute for Curriculum and Evaluation, 2016).

Latvia

Latvia's School2030 initiative has, after consultation with teachers, developed a competence-based approach to their curriculum. Transversal competences

include critical thinking and problem solving, creativity and entrepreneurship, self-learning, cooperation, civic participation, and digital skills.

In the review by Charles Fadel of countries' competencies Latvia features as the highest-ranking country, though this was not possible to verify from publicly available documents in English for this snapshot of progress.

New Zealand

New Zealand's curriculum is based on five key competencies. While creative thinking is not part of these it is seen as an objective of effective pedagogy (Ministry of Education, 2015):

Reflective learners assimilate new learning, relate it to what they already know, adapt it for their own purposes, and translate thought into action. Over time, they develop their creativity,

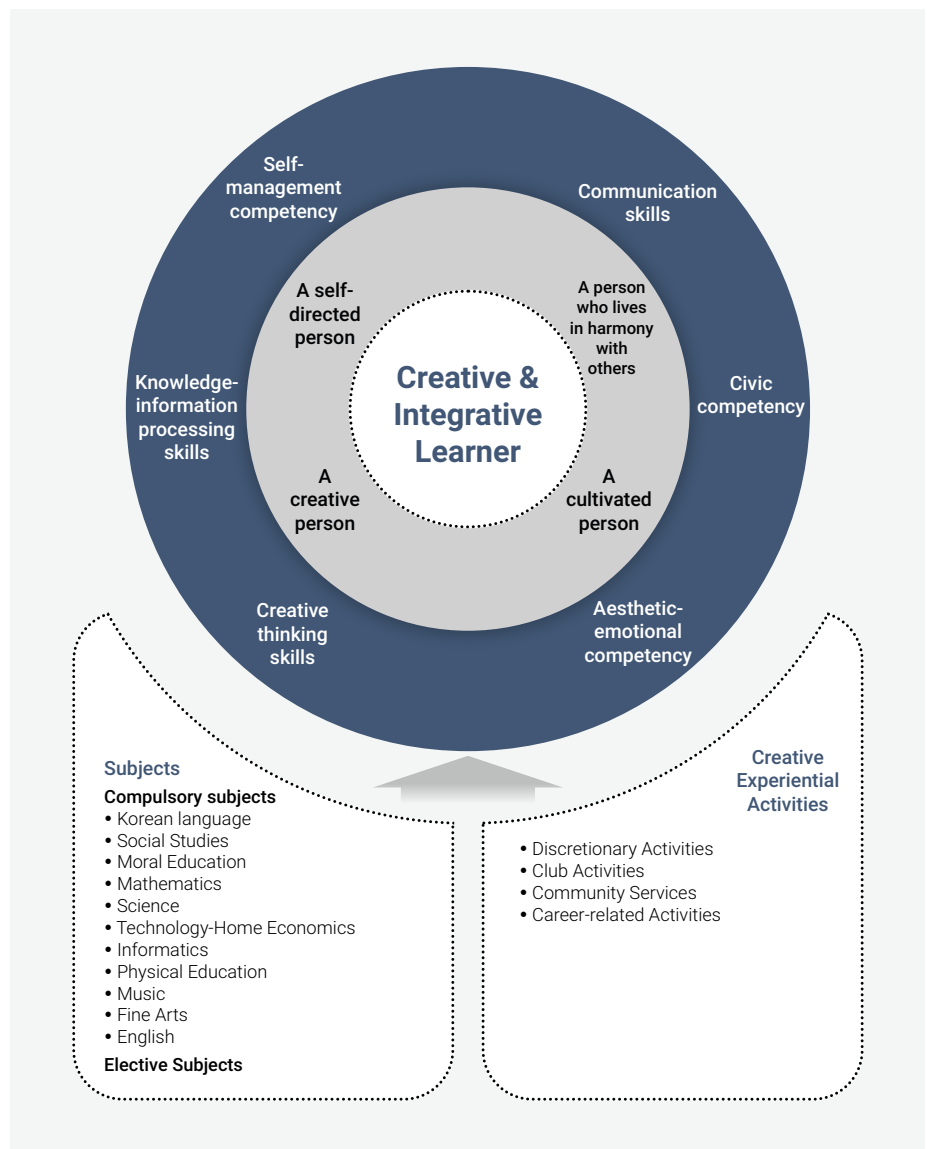


FIGURE 15

Korean framework for 2015 Revised Middle School Curriculum

their ability to think critically about information and ideas, and their metacognitive ability... (p. 34)

A government-funded initiative, Creatives in Schools, provides creative learning experiences to enhance the wellbeing of students and develop their knowledge and skills in communication, collaboration, and creative thinking and practice. Schools partner with professional artists or creative practitioner to plan and deliver a project together lasting between eight and 20 weeks¹⁹. Typically there is funding available for some 500 schools annually.

Norway

The Core Curriculum for Norway since 2017 is underpinned by six aspirational and interrelated values, which together provide a clear and coherent vision for education. One of these values is ‘The joy of creating, engagement and the urge to explore’.

The case for creativity and creative thinking is strongly made and the cultural and pedagogical approaches which may be helpful are clearly indicated, as this lengthy extract makes clear:

School shall allow the pupils to experience the joy of creating, engagement and the urge to explore, and allow them to experience seeing opportunities and transforming ideas into practical actions.

Children and young people are curious and want to discover and create. The teaching and training must give the pupils rich opportunities to become engaged and develop the urge to explore. The ability to ask questions, explore and experiment are important for in- depth learning. The school must respect and nurture different ways of exploring and creating. The pupils must learn and develop through sensory perceptions and thinking, aesthetic forms of expressions and practical activities.

In a larger perspective, creative learning processes are also a necessary part of the pupils’ development as human

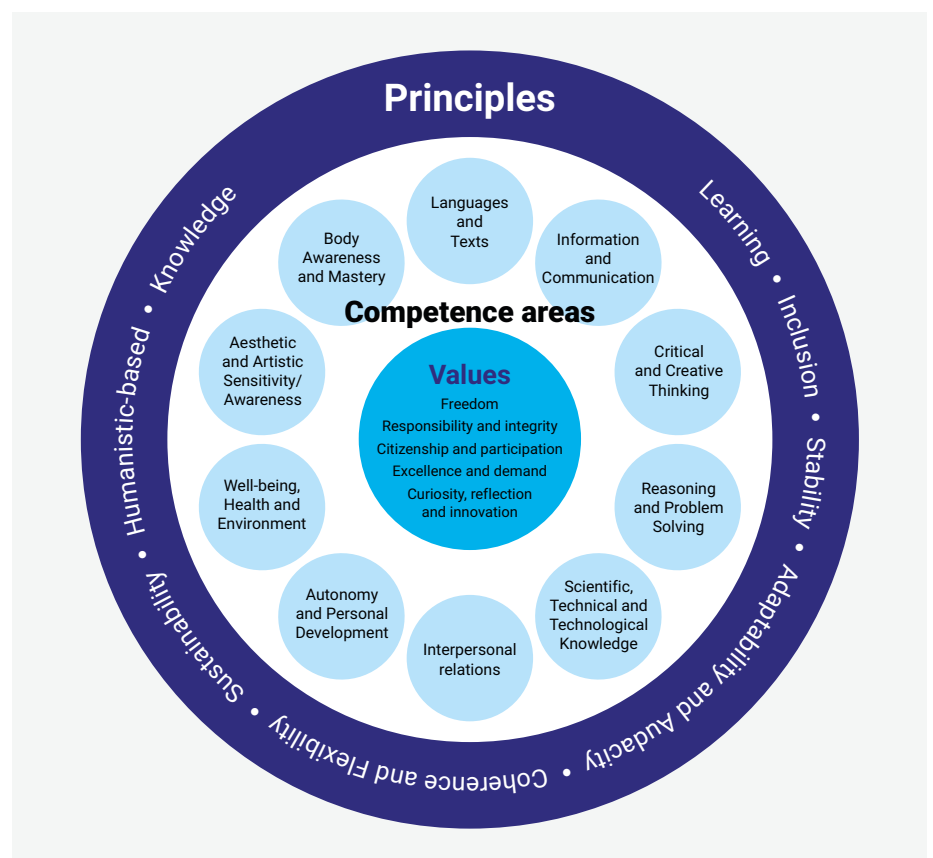
*beings and in the development of their identity. The school must appreciate and stimulate the curiosity and creative power of the pupils, and the pupils must be allowed to use their creative energy throughout their entire schooling.*²⁰

Explicit in the Norwegian curriculum is a commitment to interdisciplinary learning focused on three topics – health and life skills, democracy and citizenship, and sustainable development.

Portugal

Since 2017 the Portuguese Curriculum has been organised around ten competences, one of which is critical and creative thinking. **Figure 16** shows the range of competences which make up a student’s profile at the end of their schooling. It assumed that each curriculum area contributes to the development of all competence areas and so competence areas are not strictly separated into specific components or curriculum domains (OECD, 2018).

FIGURE 16
Conceptual Framework for Students’ End of Compulsory Schooling Profile in Portugal.



19 <https://www.education.govt.nz/our-work/publications/budget-2019/creatives-in-schools/>

20 <https://www.udir.no/lk20/overordnet-del/opplaringens-verdigrunnlag/1.4-skaperglede-engasjement-og-utforskertrang/?lang=eng>

Scotland

Creative thinking is prominent in many aspects of educational life in Scotland. The Scottish Curriculum for Excellence is built around four capacities aimed at helping children and young people to become successful learners, confident individuals, responsible citizens and effective contributors. Part of being a successful learner is the capacity to be open to new thinking and ideas and think creatively and independently.

Education Scotland (2013) defines creativity as:

...a process which generates ideas that have value to the individual. It involves looking at familiar things with a fresh eye, examining problems with an open mind, making connections, learning from mistakes and using imagination to explore new possibilities. (p. 3)

The city of Edinburgh, like the state of Victoria in Australia, has developed its own creative thinking progression framework, see Appendix 3²¹.

Scotland not only defines and resources the teaching of creative thinking but has thought carefully about implementation, as described in *Creative Scotland and Education Scotland Action Plan 2021–2022* (Creative Scotland and Education Scotland, 2021). Central to this is a National Creativity Learning Network (NCLN) made up of local authority Creative Learning leads, who champion creativity in schools and communities. The NCLN builds capacity for creativity, working closely with leaders, practitioners, and learners, promotes the value of creativity skills, and makes strong links between creativity and employability, and the power of creativity to help narrow the attainment gap. Each year Scotland holds a national creativity event, a week of online professional learning and public events.

Recently the General Teaching Council for Scotland (2022) published a professional learning guide for teachers exploring creativity in learning and teaching. This is just one example of many resources which are available to teachers and school leaders, many of which are available through a central online hub, Creativity Portal²².

Scotland, like a number of countries committed to embedding creative thinking in schools is increasingly seeing interdisciplinary learning as important (Royal Society of Edinburgh, 2020):

Breadth of knowledge and skills are the keys to translating creativity, curiosity and innovation into economic growth and employment. (p. 3)

Singapore

The Singaporean curriculum frames the education of its citizens in terms of some specific desired outcomes, one of which is that, by the end of secondary education, students should be creative and have an inquiring mind. The Singapore Ministry of Education uses the word 'inventive' as a near synonym for 'creative' in its approach to its curriculum, **Figure 17**.

Singapore is a particularly interesting case in terms of creative thinking. In the PISA 2015 tests it was the top performing OECD country in science, mathematics and reading. Some commentators, for example Koh, Tan and Ng (2012), have voiced concerns that Singapore's exam-driven and teacher-centred assessment practices inhibit creative thinking so that students, while strong in examinations are less capable in higher order thinking and real-life problem solving. Their competencies-based curriculum is an attempt to be successful in both conventional academic tests and also in critical and inventive thinking.

21 <https://education.gov.scot/media/yugpbii/ed-council-creativity-skills-3-18-progression-framework.pdf>

22 <https://www.creativityportal.org.uk/>

23 <https://www.moe.gov.sg/education-in-sg/21st-century-competencies>

Sweden

In 2018 The Swedish Ministry of Education and Research revised the national curriculum students (Swedish Ministry of Education and Research, 2018). Creative thinking is a goal of compulsory education, specifically that:

- can solve problems and transform ideas into action in a creative and responsible way, p. 11
- can make use of critical thinking and independently formulate standpoints based on knowledge and ethical considerations. p. 12

While creative thinking is mentioned on a number of occasions in curriculum documents it is still mainly linked to the arts. Indeed, since 2008, the Swedish Arts Council has worked with the government to run The Creative Schools initiative with the aim of strengthening the work of schools in the area of culture. Since 2013 Creative Schools has covered all of compulsory school and applies to both state and independent schools.

In the review by Charles Fadel of countries' competencies Sweden features as one of the highest-ranking countries, though this was not possible to verify from publicly available documents in English for this snapshot of progress.

Wales

Creativity is at the heart of the new Welsh Curriculum introduced into schools in 2022. The curriculum is underpinned by four pillars:

1. ambitious, capable learners, ready to learn throughout their lives
2. enterprising, creative contributors, ready to play a full part in life and work
3. ethical, informed citizens of Wales and the world
4. healthy, confident individuals, ready to lead fulfilling lives as valued members of society.²⁴



Creative thinking sits within the second pillar creative thinking. With Arts Council Wales, the Welsh Education Department, in partnership with Creativity, Culture and Education has invested heavily in embedding creativity in schools in the Lead Creative School programme which, to date, has more than 540 schools. The programme uses the five-dimensional model of creativity developed by the Centre for Real-World Learning with the aim of improving and encouraging young people's imagination, inquisitiveness, collaboration, persistence and resilience.

Multi-country comparisons

Most of the information for the eighteen countries listed above is available in English on the Internet. An additional source of data can be found where organisations or researchers have undertaken comparative study of aspects of creative thinking across a number of countries. Some examples of such studies and the countries/ jurisdictions covered are listed below.

FIGURE 17
Singapore Framework for 21st Century Competencies and Student Outcomes²³

24 <https://hwb.gov.wales/curriculum-for-wales/designing-your-curriculum/developing-a-vision-for-curriculum-design/#curriculum-design-and-the-four-purposes>

- British Education Research Journal (Wyse and Ferrari, 2015) – the 28 countries of the European Union.
- UNESCO – (Care and Luo, 2018) Australia, Hong Kong (China), Malaysia, Mongolia, Philippines, Korea Thailand and Vietnam.
- OECD-CERI (Vincent-Lancrin et al., 2019) – Brazil, France, Hungary, India, Netherlands, Russian Federation, Slovak Republic, Spain, Thailand, United States and Wales.
- Brookings Institution (Taylor et al., 2020) – Australia, Alberta (Canada), British Columbia (Canada), Taiwan (China), Denmark, England, Finland, Hong Kong (China), Japan, Massachusetts (USA), New Brunswick (Canada), New South Wales (Australia), New Zealand, Ontario (Canada), Portugal, Russia, Scotland, Singapore, South Korea, USA and Victoria (Australia).
- Journal of Advanced Academics (Patson et al., 2021) – Australia, England, Estonia common Finland, Hong Kong (China), Hungary, Korea Iceland, Ireland, New Zealand and Scotland.

Another useful source of information about curriculum innovation is HundrED.org, a not-for-profit organisation which shares inspiring innovations in K12 education²⁵ and the LEGO Foundation, a charitable body championing creativity and play²⁶.

But as comparative studies or selections of innovative practices are considered from different perspectives, it is often difficult to compare like with like. Nevertheless, in compiling this snapshot they provided useful corroboration and sometimes challenge to materials available online.

A surprising omission – USA

For a country with many important centres of research into creative thinking and various policy institutes promoting creativity and critical thinking it is nevertheless very hard to extract data about the state of creative thinking in schools. In part this is because education is devolved via states to many, often small districts of schools.

Innovation in the area of creative thinking can be seen in the work of EL Education's network of districts and public schools and their emphasis on helping students to:

- **Think critically:** analyze, evaluate, and synthesize complex ideas and consider multiple perspectives
- **Communicate clearly:** write, speak, and present ideas effectively in a variety of media within and across disciplines
- **Create complex work:** demonstrate higher-order thinking, multiple perspectives and transfer of understanding²⁷.

Research by Gallup (2019) into creativity in learning in schools across the USA concluded that 'students in most classrooms today spend little time on activities that foster creativity' (p. 4).

Within the limitations of this snapshot review it has not been possible to do justice to the rich variety of experiences in schools in the USA.



Snapshot of creative thinking in curricula across the world

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.

²⁵ <https://hundred.org/en>

²⁶ <https://learningthroughplay.com/>

²⁷ <https://eleducation.org/who-we-are/our-approach>

4. CULTURE, CURRICULUM DESIGN AND PEDAGOGIES FOR CREATIVE THINKING

To start with an obvious observation – creative thinking does not appear on school timetables. It is, unlike geography, science or other subjects, invisible. While individuals might identify as, for example, a teacher of science, we do not yet have teachers of creative thinking. Creative thinking takes its place alongside other vitally important concepts such as ethical understanding or collaboration as something that educators know to be important but which do not quite fit into the fragmented world of the school day where, especially in secondary schools, students move from one subject discipline to another.

Conducive cultures for creativity

More than thirty years ago David Harrington (1990) helpfully described the core elements of a creative environment:

- The opportunity for play and experimentation/exploration
- A non-threatening atmosphere in which children are secure enough to take risks and make mistakes
- Activities presented in exciting or unusual contexts
- Opportunity for generative thought, where ideas are greeted openly
- Opportunity for critical reflection in a supportive environment
- Children given a sense of engagement and ownership of ideas and tasks
- Respect for difference and the creativity of others
- Choices given to children in terms of resources and methods.

Many others have contributed to our understanding of the features of a school climate necessary for creativity to flourish (Torrance, 1970; Cropley,

1997; Beghetto and Kaufman, 2014, Lucas and Spencer, 2017). Most recently, from research undertaken by the OECD (Vincent-Lancrin, et al., 2019), we might add these design principles:

- Integrate other disciplinary perspectives
- Include the development of a product
- Have students co-design part of the product/solution/problem
- Deal with problems that can be looked at from different perspectives
- Leave room for the unexpected. (p. 31).

Recently The Creative Schools Initiative from the University of Sydney and the University of Auckland developed an index that measures environments for creativity in schools. The Creative Classrooms Index (CCI) is a self-report measure of students' experiences of creativity-supportive educational environments. The first 10 sub-scales and items are based on Harris's (2016) framework for creativity supports in schools, including Collaboration, Problem-Solving, Critical Thinking, Playfulness, Divergent Thinking, Innovation, Discipline Knowledge, Risk-Taking, Synthesis, and Curiosity. An additional scale (Environment) considers physical environments of schools as sites for creative learning. Versions of the CCI have been developed for both primary and high school contexts. The CCI has the potential to provide schools with valid and reliable data that goes beyond a single creative environment 'score' to provide information on a range of dimensions constituting a creativity-fostering environment.

On the face of it there is nothing terribly radical about any of the desirable elements of supportive cultures. But in practice, many schools, especially



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.

Durham Commission (2019, p. 2)

secondary driven by the pressures of examination results, never leave space for the unexpected and operate in subject silos with few opportunities of encouraging disciplinary perspectives other than the one that appears on the timetable for a particular lesson. Moreover, the exam system itself is often the enemy of divergent thinking and of questions with multiple creative responses, as mark schemes in many subjects only conceive of one right answer to the problems which are set. Culturally many teachers feel unable to see students as co-designers choosing which resources to use and which methods to employ. While most teachers understand the need to let their students take appropriate risks and develop as learners, many still see mistakes as a sign of failure and, in some cultures as an indication that they have not done their job as a teacher well enough. And, with increased pressures on safeguarding and safety, it is often difficult if not impossible for teachers to take their classes to exciting or unusual places.

Principles of curriculum design for creative thinking

Curriculum designers often have to reconcile the tensions between policy, practice and values as they seek to find the best solution for a school's context. When thinking about how to design a school they will typically use words like 'breadth', 'balance', 'depth', 'coherence', 'relevance', 'progression', 'challenge' and so forth to describe their ambition. Then they will tend to focus on what a national or state curriculum requires them to include, which areas might be optional and, increasingly, which are cross-curricular or trans-disciplinary. From this starting point decisions can be taken about how the school week is organised and how the curriculum is planned.

With creative thinking (as with other concepts such as communication or collaboration) we are not dealing with an idea that is bounded by a particular subject discipline. For creative thinking

is a disposition or set of habits of mind made up of various skill clusters (see page 6). For the curriculum designer this requires a mindset shift away from more linear syllabuses focusing on the acquisition of knowledge.

The process of designing a curriculum for creative thinking is more complex. For where school syllabuses drive curriculum design, with creativity there is no standard syllabus. Creativity is, according to Andrew Hammond (2015) part of the 'invisible curriculum'. If maths and science and history, for example, are the carefully laid pavement slabs, creativity is the greenery peeping out between the slabs.

The job of the curriculum designer is, therefore, to make the invisible visible. In our model of creative thinking (Lucas and Spencer, 2017) we describe this process as 'split-screen thinking'. In this metaphor, we imagine two screens, one which has the knowledge and skills which might appear on a conventional syllabus, while the other has the habits and their attendant skills, for example those associated with 'sticking with difficulty'. The teacher's job is then to design opportunities to interweave creative thinking into whichever discipline they are teaching. To continue the weaving analogy, if subject disciplines are the warp, then dispositions²⁸ or capabilities or the wider clusters of skills contained in creative thinking make up the weft.

An important early design activity is, therefore, to create a map of opportunities to embed creative thinking. In Canada the state of Alberta has produced one of the most complete examples of split screen mapping, framing creative thinking (creativity and innovation) as a competence which intersects with the knowledge and skills of each area of the curriculum²⁹, see **Figure 18** for a high-level overview of creative thinking and science.

Four specific principles of curriculum design are important when designing for creative thinking. For many teachers

²⁸ One of the challenges when embedding creative thinking in the curriculum is the proliferation of descriptors – attributes, competences, habits of mind, transversal skills etc – which can be off-putting

²⁹ https://education.alberta.ca/media/3576124/comp-in-science_20mar_17_final.pdf

they represent a significant shift away from current practices.

1. Problem-based and extended in length

There is growing evidence that the fundamental curriculum model for effective teaching of creative thinking is problem not subject-based, enabling the development of divergent thinking across subject disciplines (Neber and Neuhaus, 2013; Lucas and Hanson, 2021). But in most secondary school timetables lessons are relatively short, something that evidence suggests is not necessarily conducive to the development of creativity. Davies et al. (2013), for example, recommend

...extended time periods for creative activities, and notes the increased interest and commitment that time can give to the value of creative learning. (p. 86)

One strategy used by some secondary schools is block scheduling with fewer, longer lessons during any week. Longer lessons invite and probably require greater variety in pedagogical approaches:

Longer class periods give teachers more time to complete lesson plans, develop key concepts, increase the creativity of lessons. (Hanover Research, 2014, p. 9).

Problem-based learning needs especially careful planning; teachers often need to work together where they are planning learning for pupils across a whole year group involving more than one subject.

2. A social act

While it is possible for individuals to exercise their creative thinking alone, it is much more common that the creative act is a collaborative or group endeavour, as many of the models discussed earlier suggest. Vlad-Petre Glăveanu (Glăveanu et al., 2021) has helpfully explored the socio-cultural complexities of collective and social acts of creativity. Keith Sawyer (Sawyer, 2017), too, has long argued that, even, when we are alone, and especially in

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 influence, and are influenced 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.

Alberta Government

a world of the Internet, we are really exercising creative collaboration.

In schools valuing collective acts by students has always been a challenge, except, perhaps, on the sports field or in artistic performances. For seen through the lens of public examinations which are based on individual performance, some will see only a thin line separating collaboration, sharing and cheating.

3. Interdisciplinary

Creative thinking can be cultivated in a specific subject, but it frequently invites teachers and their students to look across disciplines (West, 2016). For innovation and original thinking often sit between subject boundaries. Few would dispute that the most pressing problems of our age such as climate change will require contributions from many disciplines if we are to make progress.

Miranda Jefferson and Michael Anderson helpfully distinguish between three different approaches - multidisciplinary (a common theme with a focus on individual disciplines), interdisciplinary (organising the curriculum around concepts such as creative thinking) and transdisciplinary a (organising the curriculum around students concerns and questions and applying skills in real-world contexts), (Jefferson and Anderson, 2017, p. 37).

FIGURE 18

Alberta's high-level mapping of creative thinking to science

Creativity is understood in the context of a student's learning dispositions. The Learning Disposition Wheel (Figure 19) is based on research by the US National Research Council (2012) and inspired by Deci and Ryan's (2021) Self-Determination Theory. The Wheel reflects the qualities students need to develop to thrive in three distinct but overlapping domains of cognitive, interpersonal and intrapersonal. Jefferson and Anderson argue that these dispositions allow learners to be metacognitive around their learning in creativity and other critical areas of the curriculum.

4. Co-designed with students

As we saw earlier on page 25, designing a curriculum to develop creative thinking is an opportunity, within appropriate bounds, to engage learners in planning and designing the curriculum. Co-design is increasingly seen as essential in both the business world and in healthcare (Wenmoth, et al., 2021), but remains underused in schools. In part this is from very proper concerns for the duties of care that adults have for young people; in part it is because some educators find it

a challenging aspect of professional habit change.

Principles of pedagogy for creative thinking

Some three decades of research into pedagogies for teaching creative thinking have given us considerable understanding of teaching and learning methods. Journal articles, expert handbooks and evidence-based guides, some of which appear in the references to this report, have by now suggested novel ways of teaching creative thinking in every subject discipline of the school curriculum.

A world of possibilities

Anna Craft's concept of everyday or little c creativity as the focus of developing children's creative thinking in schools (Craft, 2001) helpfully frames the idea of pedagogy for teaching for creativity. It involves posing the question 'What if?' in as many ways as possible to encourage divergent thinking. It moves teachers and pupils away from focusing on 'What is this and what does it do?' to 'What can I do with this?'. With colleagues, Pam Burnard and Teresa Cremin, Craft developed a useful way of visualising this, Figure 20.

For teachers planning to cultivate creative thinking in their pupils the model invites them to consider how their chosen teaching and learning methods encourage, for example, questioning, immersion and imagination.

Yu-Sien Lin (2011) has developed a useful framework which reminds us of the inter-relatedness of teaching and learning and of the likely relationship between creative teaching and teaching for creativity, Figure 21.

Building on a model developed by Guy Claxton and colleagues (2012), Creativity, Culture and Education have developed the concept of a high-functioning classroom in which creative thinking can flourish, Figure 22.

It may not be possible or even desirable to be operating at the high functioning end of these choices all of the time. But these continua provide a framework for teachers to ask and answer questions as they consider choices about pedagogies.

FIGURE 19
The Learning Disposition Wheel
(Jefferson and Anderson, 2021)

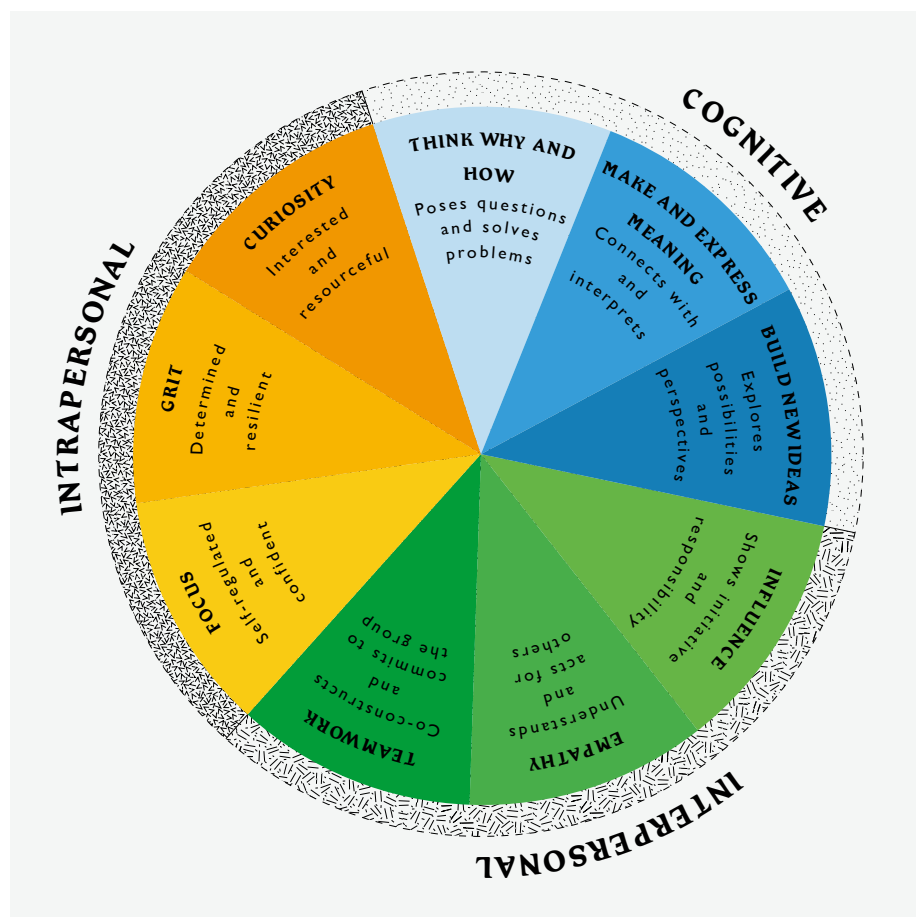


FIGURE 20

A model of possibility thinking, (Cremin et al., 2006, p. 110)

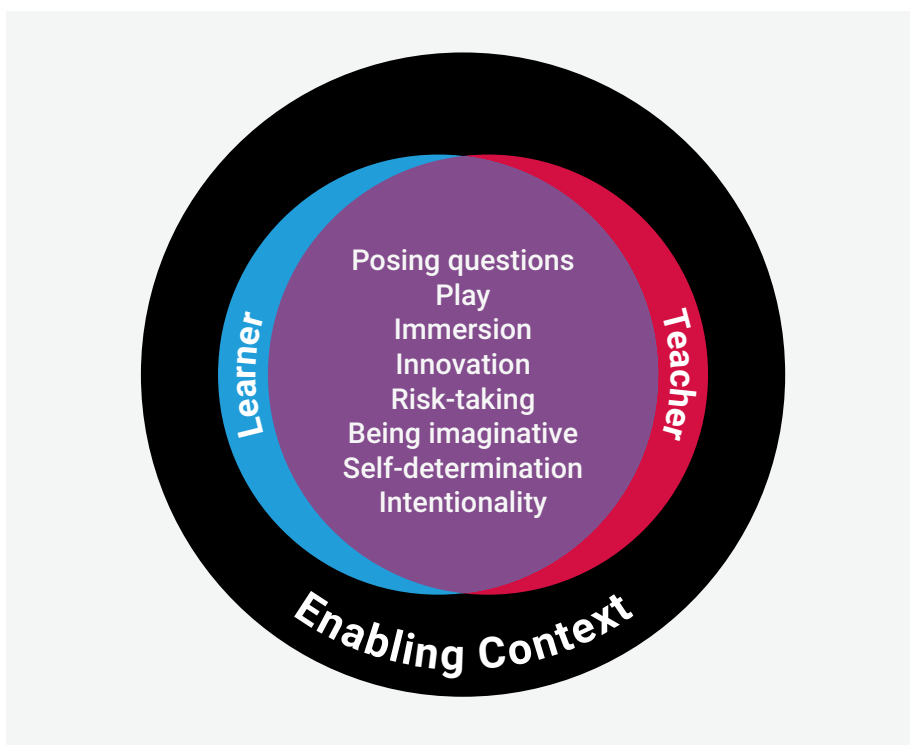
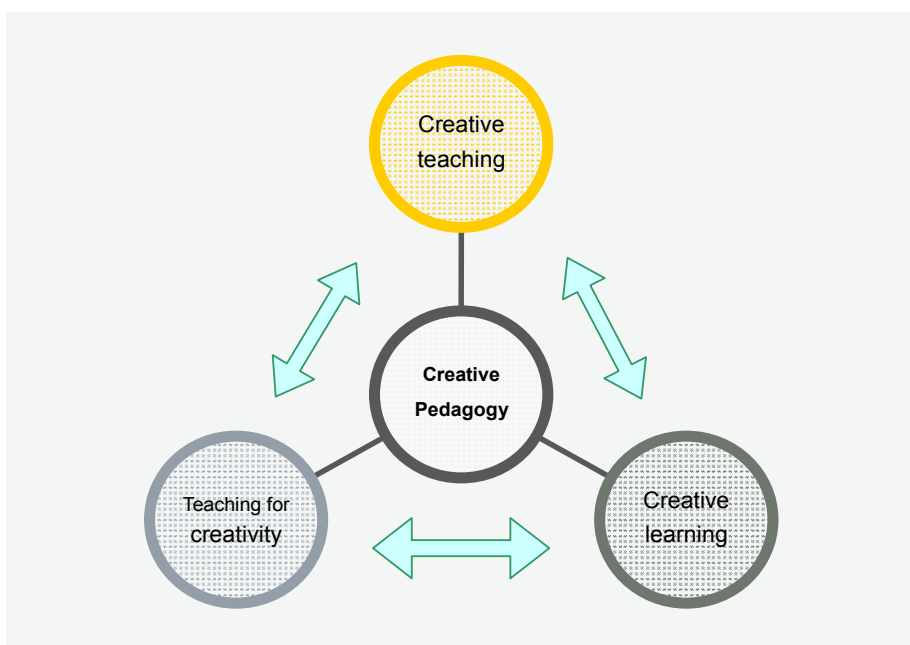


FIGURE 21

The three elements of creative pedagogy (Lin, 2011, p. 152)



Jefferson's and Anderson's (2021) Creativity Cascade coherence maker, see **Figure 23**, outlines a four-stage pedagogy of creativity:

The four-stage approach helpfully reminds educators of the essentially iterative process of creative pedagogies.

In a systematic review of research into creative pedagogies between 1990 and 2018 Teresa Cremin and Kerry Chappell (2021) found that seven interrelated features characterise creative pedagogical practices:

- generating and exploring ideas

- encouraging autonomy and agency
- playfulness; problem-solving
- risk-taking
- co-constructing and collaborating, and
- teacher creativity. (p. 27)

These features closely reflect the dimensions of culture discussed on page 25. Cremin and Chappell conclude that, while some general principles are emerging, there is a need for much more data on the efficacy of pedagogies and their impact on learners.

Practically speaking:

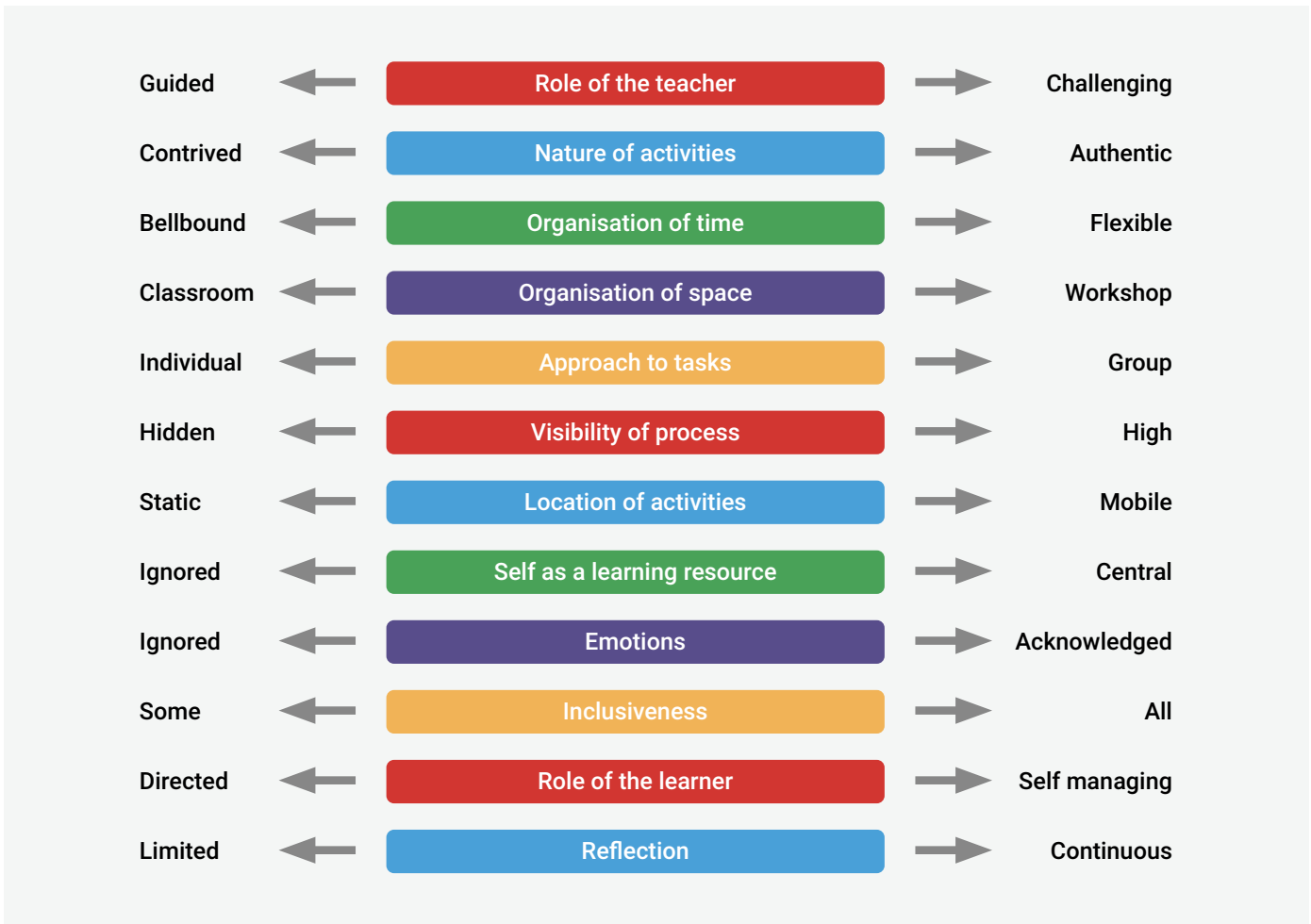
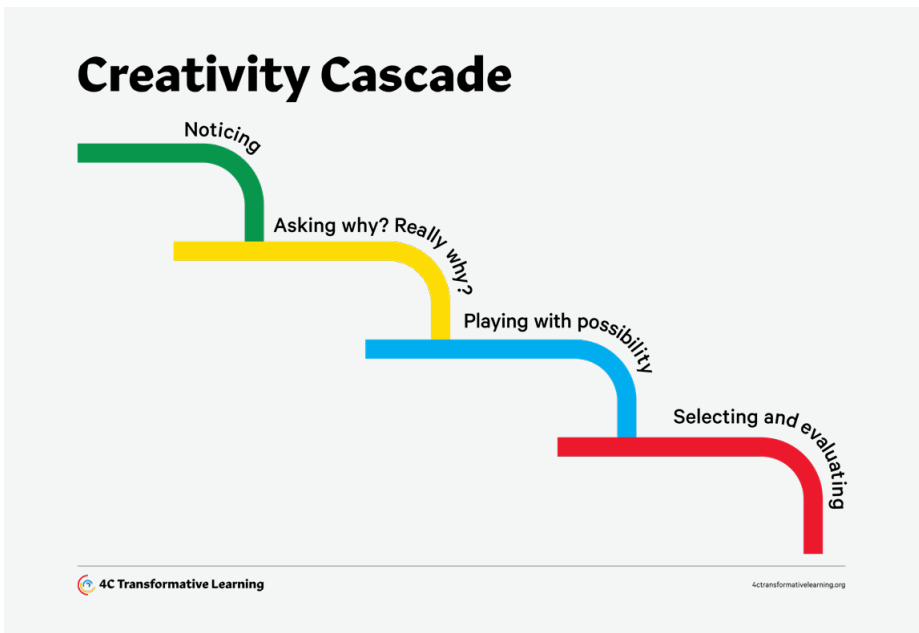


FIGURE 22
The high functioning classroom
(Creativity, Culture and Education,
2012, p.20)

FIGURE 23
The Creativity Cascade (Jefferson
and Anderson, 2021)



It is evident that educators too need working definitions of creativity, of its cultural and disciplinary differences, and a richly nuanced understanding of creative pedagogies. If teachers are encouraged to recognise the complexity of such practice, they will be better positioned to deploy their creativity in planning and co-designing the curriculum with their students. (Kerry and Chappell, p. 28)

A world of inevitable uncertainties

Ron Beghetto, often in collaboration with others, has significantly shaped thinking about pedagogies for creative thinking over the last two decades. Spanning research and practice communities he has consistently emphasised the importance of taking risks as a teacher, what he calls ‘beautiful risks’ (Beghetto, 2018), those risks which, as a teacher, may stimulate creative thinking.

Developing Anna Craft’s idea of possibility thinking he suggests that

there are four kinds of pedagogies of the possible (Beghetto, 2020) adapted from page 4:

1. A level of open-endedness, allowing for some uncertainty in how students might address a problem, what the outcomes will be or solutions the students will generate and even what problems students choose to solve.
2. Non-linearity, not designed with predetermined processes and ends in mind.
3. Engaging with a plurality of perspectives, bringing their own different social-cultural and historical experiences into the learning event.
4. Future orientated, not focusing on reproducing what already exists, but rather moving toward future possibilities, requiring them to shift focus working through uncertainty to manifest new ways of thinking and acting.

Once creativity is conceptualised as being uniquely related to uncertainty, educators can, paradoxically, relax into their teaching knowing that the rules of the game are rather different. Beghetto (2021) sums up this phenomenon of creativity beautifully:

Without uncertainty, there is no creative learning. This is because uncertainty establishes the conditions necessary for new thought and action. If students (and teachers) already know what to do and how to do it, then they are rehearsing or reinforcing knowledge and skills. (p. 483)

Signature pedagogies for creative thinking

While our understanding of some of the key features of effective pedagogies for cultivating creative thinking is growing, for as long as they exist at the level of an 'element' or 'principle' for teachers they can seem too vague to be useable.

A helpful concept in thinking about teaching creative thinking is the idea of a 'signature pedagogy'. First suggested by Lee Shulman in the context of preparing learners for different vocational routes, these are 'the types of teaching that organise the fundamental

ways in which future practitioners are educated for their new professions' (2005). So, if preparing a care assistant, one might use role play and simulations to explore different scenarios without risk to clients or an engineer might use problem-based learning and design thinking to learn how to work through a brief. A signature pedagogy is the kind of learning method most suited to a particular desired outcome, in our context, for the teaching of creative thinking. By 'signature' is meant those methods which are most closely associated with what we want to learn. Such methods are, if you like, the unique DNA or fingerprint of creative thinking.

In earlier research, Lucas and Spencer (2017) mapped five signature pedagogies to the five aspects of the CRL model of creative thinking, **Figure 24.**

Each of the five signature pedagogies is illustrated by three specific teaching methods such as, for example, 'Mantle of the Expert' (the creation of a fictional world where students assume the roles of experts in a specific field) or 'Philosophy for Children' (an approach to teaching and learning, in which children take part in philosophical enquiry).

In a recent four-year, eleven country study by the OECD (Vincent-Lancrin et al., 2019) 11 signature pedagogies likely to be effective in cultivating creative dispositions in all subjects were identified:

1. 'Creative Partnerships' – 'partnerships between creative practitioners and schools' (p. 101).
2. 'Design Thinking' – a method adopted from business. Involves 'engaging students in learning experiences in which they think and act like designers' (p. 103).
3. Dialogic teaching – a teaching method that 'fosters continuous and controlled dialogue between students and teachers' (p. 105).
4. Metacognitive pedagogy – 'an approach that makes teachers and students reflect on their teaching and learning' (p. 107).
5. 'Modern Band Movement' – its programmes 'draw upon a teaching method called 'Music as a Second Language'' (p. 109).

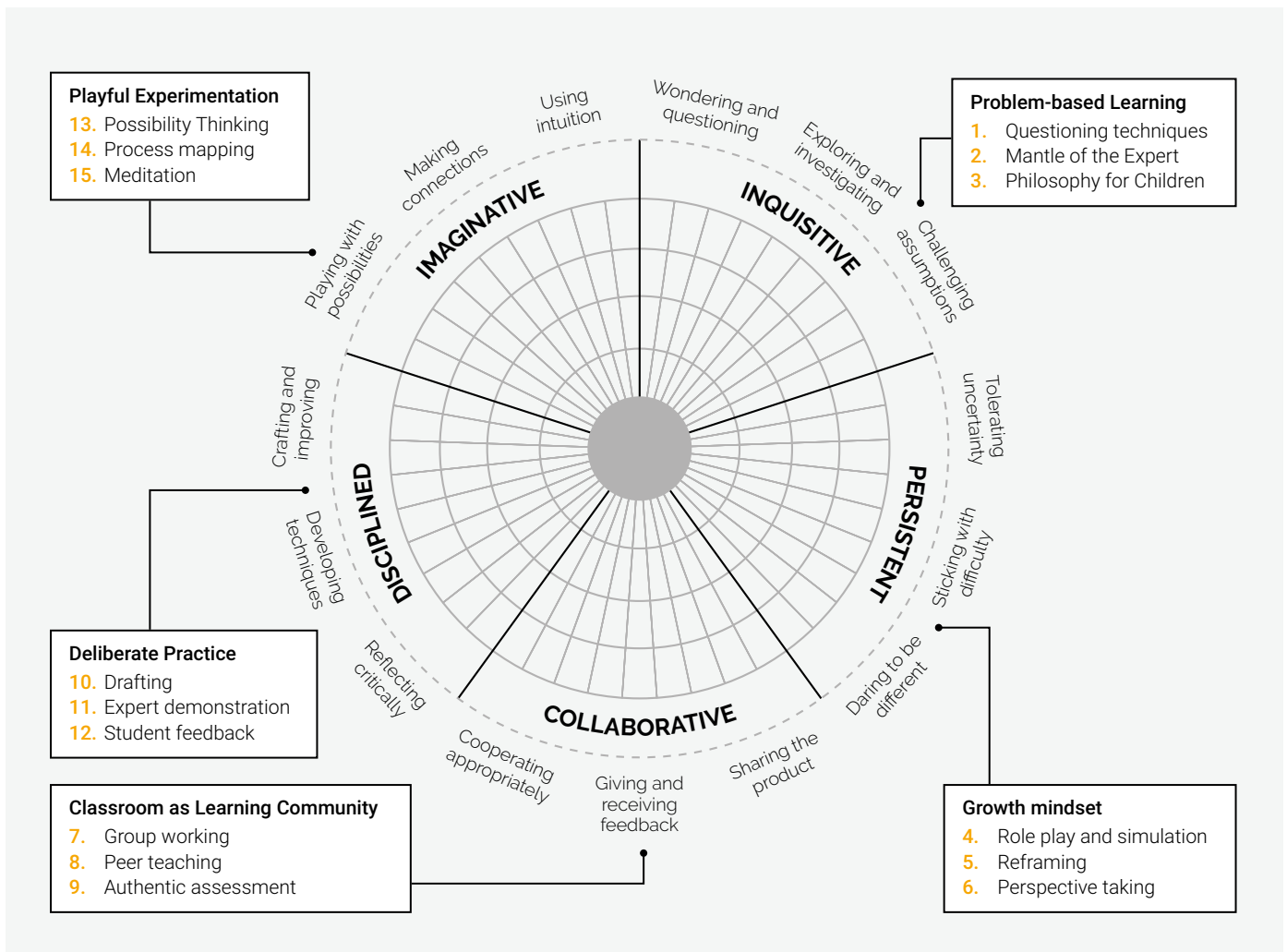


FIGURE 24
Signature pedagogies for teaching creative thinking, (Lucas and Spencer, 2017)

6. 'Montessori' – a model with successive stages of development corresponding to 'periods of schooling with learning environments and curricula designed to respond to the needs and characteristics of each stage' (p. 111).
7. 'Orff Schulwerk' – a pedagogical model 'focused on creativity' where learners are 'led through a discovery learning process of exploring, experimenting, selecting and creating' (p. 113).
8. Project-Based learning – a cross-disciplinary method of instruction' to 'develop learners' in-depth understanding of academic content along with a wide range of skills' (p. 115).
9. Research-based learning – an approach promoting 'a research project as part of a learning and teaching strategy' (p. 117).
10. 'Studio Thinking' – a framework with four structures 'describing the interactions of time, space and

relationships between teacher and students' and eight habits of mind for visual arts classrooms (p. 119).

11. 'Teaching for Artistic Behavior' – a 'pedagogical approach based on student agency and choice' (p. 121).

The OECD did not seek to match individual signature pedagogies to specific aspects of creativity, just to find compelling evidence of their efficacy.

Intentional and systematic, not accidental and opportunistic

Recent analysis by the Center for Curriculum Redesign (Dunn et al., 2021) reminds us that, just as if you value a subject such as chemistry or history you would not leave it to chance as to whether students had opportunities to learn about it, so with creative thinking, we cannot assume that students will acquire capability and confidence accidentally.

The Center concludes that competencies/dispositions like

creative thinking need to be taught in ways that are:

- Deliberate, integrated across contexts.
- Explicit, with as much focus as there is on subject knowledge and with lessons incorporating creative components with time to properly present and practice creative thinking subskills.
- Comprehensive, with learners encountering chances to improve creative thinking at through the course of their education.
- Systematic, ensuring that creative thinking is paired with the disciplines that best support it and vice versa, in ways that align with both teacher expertise and insights from research.
- Demonstrable, with student progress in creative thinking measurable against research-backed assessment items. (Adapted from Dunn et al., 2021, p. 5)

While there may be emerging understanding about the cultures, curricula and pedagogies most suited to the development of creative thinking in schools there remains a significant gap between what we know from research and what teachers actually do.

In a study of creative thinking in 11 jurisdictions – Australia, England, Hungary, Estonia, Hong Kong (China), Iceland, Ireland, New Zealand, Scotland, Singapore and South Korea – researchers (Patson et al., 2021) found that, even in those countries where creativity and creative thinking is a curriculum priority, that teacher confidence and capability lags:

...the journey from openly acknowledging the importance of creativity to systematically and purposefully supporting its promotion in the classroom is a long one. (p. 207)



Snapshot of culture, curriculum design and pedagogies for creative thinking globally

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.

5. ASSESSING AND EVIDENCING PROGRESSION IN CREATIVE THINKING



You can't use up creativity. The more you use, the more you have.

Mayo Angelou (Elliot, 1989, p. vii)

Although aspects of creativity have been measured for more than half a century, it is not something that most schools assess today (Spencer et al., 2012). While researchers have developed many well-used ways of measuring creativity, the Torrance Tests of Creative Thinking is a good example (Torrance, 1966), it is only in the last two decades, as national curricula have begun to specify dispositions such as creative thinking, that schools have begun to consider the benefits of assessment.

There have been healthy debates in the research literature. These include:

- whether creativity can be assessed in the classroom (Piffer, 2012; Blamires and Peterson, 2014)
- the practical challenges of 'seeing' creative processes which exist inside learners' heads as opposed to the people they are, the products they generate or the social context in which they operate (Patson et al., 2021)
- the degree to which creativity is domain-specific or not (Plucker and Beghetto, 2004)
- the role of assessment for learning as opposed to summative measurement (Bolden et al., 2020).

Some teachers worry that assessing creativity will somehow diminish it (Lucas et al., 2013) but, as the quotation from Maya Angelou which starts this section reminds us, that is not how creative thinking works.

All these arguments are theoretical, however. For creative thinking has, since 2016, been routinely assessed in Victoria, Australia³⁰ and in the new PISA Test of creative thinking in 2022³¹.

Why assess creative thinking?

There are at least three reasons why assessing creative thinking can be helpful.

1. Improving the status of creative thinking

The selection by PISA of creative thinking as the focus of a new test in 2022 (OECD Directorate for Education and Skills, 2019) has undoubtedly boosted the status of creative thinking among politicians and educators. For it gives out a number of key messages – that it has a robust definition, that it can be learned, that it can take its place alongside literacy, numeracy, science and other subjects for study and, of course, that it is technically possible to assess it (Foster and Schleicher, 2022). The recent publication, *Thinking outside the box: PISA 2022 Creative Thinking Assessment* (OECD, 2022) makes a clear, well-evidenced case for the importance of creative thinking.

2. Enhancing the quality of teaching and learning

In earlier research trialling approaches to assessing creative thinking (Lucas et al., 2013) teachers reported that the main benefit of assessing creativity was to make teaching and learning more effective and as an aid to understanding in pupils:

30 <https://www.vcaa.vic.edu.au/assessment/f-10assessment/edstateap/Pages/cct-assessments.aspx>

31 <https://www.oecd.org/pisa/innovation/creative-thinking/>

...the primary use of the tool is in enabling teachers to become more precise and confident in their teaching of creativity and as a formative tool to enable learners to record and better develop their creativity. (p. 26)

To be able to assess anything teachers need to understand it, be confident as to how to teach it and have a sense of what progress looks like. In Western Australia teachers found moderating student's creative work, products and processes, extremely helpful in improving both their understanding and the quality of their teaching, see *A field guide to assessing creative thinking* (Lucas, 2021).

3. Promoting a shared understanding of creative thinking

To assess anything, it is important to have a common understanding of it (OECD, 2019). By having to define it and exemplify what it looks like in different contexts, shared understanding is created (Lucas, 2021; Vincent-Lancrin et al., 2019).

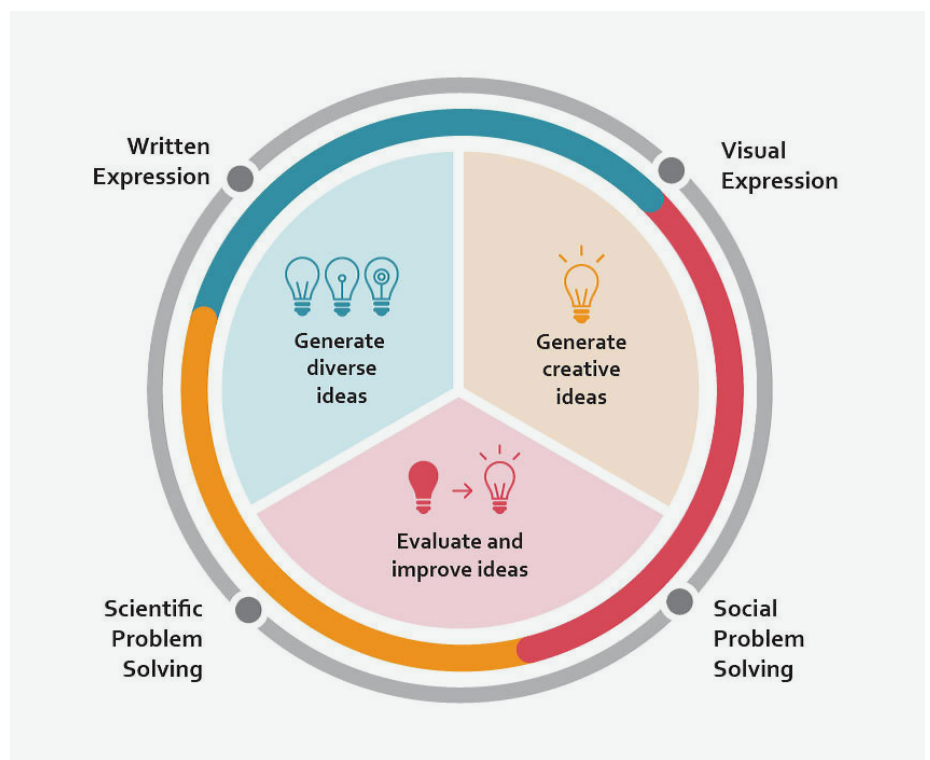
For these three reasons and more the fact that PISA chose creative thinking as the focus of its new 2022 test is highly significant. Although the PISA test experience is of a one-hour online experience and not, therefore, immediately translatable into the classroom, it has laid down a marker to the educational world that creative thinking is important, well-understood, learnable and capable of sitting alongside the more well-known tests of reading, mathematics and science. The PISA Creative Thinking Test in 2022 seeks to clarify not just the elements of creative thinking – generating diverse ideas, generating creative ideas and evaluating and improving ideas – but also to suggest two domains in which they might be embedded and two modes through which they might be expressed, see **Figure 25**.

Shifting perspectives on assessment globally

Across the world there is a growing sense that our assessment practices are too narrow and overly geared to subject disciplines. Two organisations, New Metrics for Success in Australia³² and Rethinking Assessment in England³³ are in the forefront of a movement to develop more nuanced, multi-modal ways of evidencing the full range of young people's strengths. To this end both organisations are developing prototype learning profiles, see **Figure 26** for Rethinking Assessment's version.

Significantly for this report, there are currently no attempts to evidence the creative thinking abilities of young people except in a very small number of examples. The work taking place in Victoria in Australia (see page 13) is perhaps the best known. More recently schools in and around Perth have been exploring a range of formative assessment methods, available as *A field guide to assessing creative thinking* (Lucas, 2021). And the 2022 PISA test of creative thinking will have results available in 2024 from which educators can learn.

FIGURE 25
PISA Creative Thinking Test (OECD, 2019, p. 23)



32 <https://education.unimelb.edu.au/new-metrics-for-success>

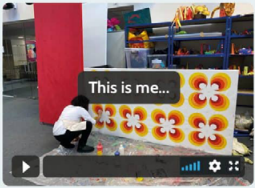
33 <https://rethinkingassessment.com/>



Harriet Smith

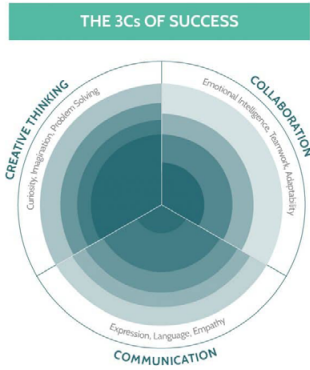
I am a Year 13 student who has a passion for science and is looking to study engineering at university...

[My Portfolio](#)



My Interests

- Science
- Photography
- Digital
- Running
- Psychology
- Nature



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 including 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

MY BEAUTIFUL WORK



MY ACHIEVEMENTS

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

FIGURE 26

Rethinking Assessment prototype of a profile to evidence progress in creative thinking as part of the 3 Cs of Success

Innovation in assessing creative thinking

Just as Australia has, arguably, led the world in curriculum development, so too the Australian Council for Educational Research (ACER) has done some of the most important work in exploring ways in which general capabilities such as Critical and Creative Thinking can best be assessed (Scouler et al., 2020). At the heart of ACER's approach is the requirement for teachers to focus on the growth of the respective skills associated with a particular capability or disposition and how these skills can best be demonstrated.

ACER has developed a model of Creative Thinking which has three strands – Generation of ideas, Experimentation and Quality of ideas (Ramalingam et al., 2020), see **Figure 27**. Each strand has two or three more specific aspects. In doing this ACER has focused on one of the four elements of Critical and Creative

Thinking as it appears in the Australian Curriculum (see Appendix 1).

ACER uses a simple three level description of progress – low, mid and high and **Figure 28** indicates what progress might look like for two aspects of Creative Thinking:

In schools there are many ways in which teachers can track the development of young people's creative thinking, increasingly used in both Australia and England, (Lucas and Spencer, 2017), **Figure 29**.

Brandt (2021) reminds us of the importance of multi-modality in assessing creative thinking:

Assessment of creativity should employ multiple measures to holistically understand an individual's or group's creative potential, including both strengths and areas for improvement. (p. 23)

FIGURE 27

ACER Creative Thinking Skills Framework (Ramalingam et al., 2020, p. 6)

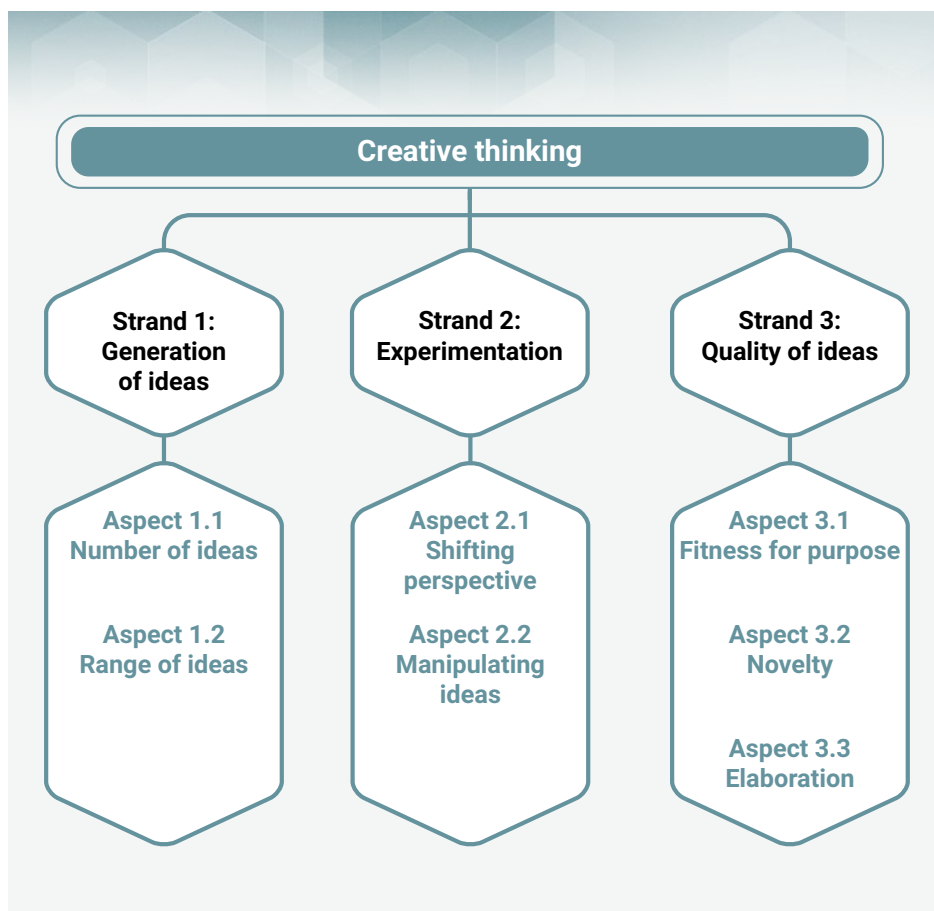


FIGURE 28

ACER Creative Thinking Skills Framework (Scouler et al., 2020, p. 12)

Skill	Aspect	Curriculum	Assessment	Pedagogy
		Learning outcome	Assessment criteria	Teaching strategy
Creative thinking	Aspect 2.1 Shifting perspective	Critical and creative thinking Element: Generating ideas, possibilities and actions Sub-element: Consider alternatives: identify situations where current approaches do not work, challenge existing ideas and generate alternative solutions	High: Learners demonstrate a willingness to experiment, shifting beyond conventional perspectives leading to new possibilities. They question and renegotiate the boundaries of the task to navigate around possible constraints. They test out multiple pathways, even those that seem unlikely. Mid: Learners can shift perspective, thinking about the task in a different way and considering the task from a range of conventional perspectives. They are willing to test out an alternative pathway. Low: Learners view the task through their single perspective without consideration of what the task elements can be changed, or considering alternative perspectives or pathways.	Teach techniques for reconsidering problems and situations, such as a Circle of Viewpoints routine, Six Thinking Hats or a PO disruption.
	3.2 Novelty	Critical and creative thinking Element: Generating ideas, possibilities and actions Sub-element: Imagine possibilities and connect ideas: Combine ideas in a variety of ways and from a range of sources to create new possibilities	High: Learners develop some original ideas containing concepts less familiar to them beyond their social context. Low: Learners present ideas that are obvious or conventional and contain concepts that are already familiar to them.	Challenge students to consider a range of novel solutions or ideas by facilitating an extended brainstorm (i.e. beyond fluency of ideas) to encourage flexibility or range, originality and elaboration of thinking.

FIGURE 29

Multi-modal assessment of creative thinking, (Lucas and Spencer 2017)

PUPIL	TEACHER	REAL-WORLD	ONLINE
Real-time feedback	Criterion-referenced grading	Expert reviews	Digital badges
Photographs	Rating of products and processes	Gallery critique	E-portfolios
Self-report questionnaires	Structured interviews	Authentic tests eg	
Logs/diaries/ journals	Performance tasks	displays	
Peer review	Capstone projects	presentations,	
Group critique		interviews	
Badges		podcasts	
Portfolios		films	
		Exhibitions	

TABLE 4

The lack of guidance for pedagogy and assessment, (Adapted from Taylor et al., 2020)

	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

The LEGO Foundation (McLure and Jaeger, 2020), well-known for its advocacy of play, has helpfully wrestled with historical antagonism to the assessment of creativity, suggesting that it does not need to inhibit playful exploration:

The short answer is that we must be able to assess children’s creativity in some way. This idea is controversial: for some, the very combination of the terms ‘assessment’ and ‘creativity’ can seem contradictory. However, if we want to know whether we’re actually doing our best to support children, we have to be able to observe progress and wrestle with this seeming paradox. (p. 4)

Challenges in evidencing creative thinking

Notwithstanding considerable progress, assessing creative thinking in schools remains a challenging idea for many teachers for much creativity is invisible. **Table 4** reminds us that, while creative thinking – creativity and critical thinking – may be being talked about in the curriculum documents of educational jurisdictions, advice on how to teach or evidence it remains thin on the ground.



Snapshot of the assessment of creative thinking

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.

6. THE STATE OF PROFESSIONAL LEARNING FOR CREATIVE THINKING

To embed creative thinking in schools across the world will require massive change. Relatively small numbers of school leaders and teachers are already doing it intentionally and systematically, and the vast majority of schools will need, as the introductory quotation on this page suggests, to be exposed to new ideas and experiences. Evidence suggests that the mechanism for the transformation needed is professional learning in all its forms. This short section contains a few reflections on what we know about effective professional learning and system change.

Effective professional learning in schools

A recent review of the evidence from across the world from the Education Endowment Foundation (Collin and Smith, 2021) helpfully summarises what is known about effective professional development:

- a) Build knowledge – Managing cognitive load, Revisiting prior learning
- b) Motivate staff – Setting and agreeing on goals, Presenting information from a credible source, Providing affirmation and reinforcement after progress
- c) Develop teaching techniques – Instruction, Social support, Modelling,
- d) Monitoring and feedback – Rehearsal
- e) Embed practice – Providing prompts and cues, Prompting action planning, Encouraging monitoring, Prompting context specific repetition. (p.8)

But while this is helpful as an evidence-based description of what needs to happen, when we are dealing with topics with a long history of widely understood techniques, trying, for example, to improve the quality of science teaching

within established curriculum and assessment frameworks, when dealing with creative thinking it does not quite work.

For creative thinking can seem to many teachers and school leaders to be fundamentally at odds with the culture of accountability within which they are working as a recent survey in England (Britain Thinks, 2019) indicated:

You too may already be aware of the classroom impact of an assessment-led system. Such pressure can limit opportunities for creative endeavour and may tempt you to stay within the safe boundaries of the known. Recognising that tensions exist between the incessant drive to raise measurable standards and the impulse to teach more creatively is a good starting point, but finding the energy and enterprise to respond flexibly is a real challenge. (p. 429).

The scale of the challenge

Embedding creative thinking in schools requires radical changes in behaviour. A recent review of the leadership needed to cultivate creative thinking in schools (Lucas et al., 2021) highlights some of the issues which need to be considered including:

- making the case for change with regard to creativity within and beyond the school
- creating a conducive culture for creativity to flourish, often in accountability regimes which are unfavourable
- creating opportunities for interdisciplinary learning and for teachers to co-design lessons, potentially creating longer lessons at secondary level
- understanding and using a range of signature pedagogies



Creativity is stimulated in an environment full of new ideas and experiences. The more exposed people are to ideas and others who think differently, and the more opportunities they have to think through new ways of approaching work, the more adventurous they tend to become. Bringing in new ideas is essential life blood in schools.

Louise Stoll and Julie Temperley (2009, p. 70)

- building understanding of and confidence in using a range of formative assessment techniques
- engaging appropriately with learners as active agents in their learning
- working with a range of external partners to bring about and embed changes.

For most schools truly to embrace the idea of embedding creative thinking (along with other key capabilities such as collaboration and communication) across all aspects of school life is not simply about tweaking the status quo. As Claire Sinnema and Louise Stoll (2020) helpfully remind us:

Schools must be open to and ready for significant change to bring new curricula to life in ways that engage students, offer enriching learning experiences and enhance a diverse range of outcomes. 'Business as usual' will not suffice. (Sinnema and Stoll, 2020, p.10)

Sinnema and Stoll argue compellingly that there are four specific challenges to be faced by schools embarking upon significant change:

1. the depth of understanding required (for example in understanding progression, curriculum design and pedagogy)
2. the pace necessary for curriculum changes to be realised and truly embedded
3. the extent of spread and buy-in (a classic challenge with creative thinking is that while its relevance is immediately grasped in arts subjects, others may need longer to come on board), and
4. the reach of the new curriculum in terms of learners actually experiencing the aspirations set out in a new approach to a creative curriculum.

Schools which embrace creative thinking, are focused on providing deeper learning experiences for their students. Such schools tend also to recognise the importance of extended, problem-based challenges,

collaborative learning across as well as within disciplines, and the importance of student agency. Jal Mehta and Sarah Fine make this connection clearly:

Deeper learning often emerges at the intersection of mastery, identity, and creativity. (Mehta and Fine, p.5)

For teachers and leaders new to these ways of working new approaches will be required:

As the goals for instruction move from procedural and algorithmic to more conceptual and open-ended, teachers will need both to learn new content knowledge and to develop different teaching strategies. (Mehta and Fine, p.17)

In our work (Lucas, Spencer and Stoll, 2021) we have argued that the scale of the challenges just articulated require more than conventional professional learning; they need to be rooted in professional learning communities over a significant period of time. And the school fares best when it conceives of itself not as an essentially stable entity but as a learning organisation constantly adapting (Stoll and Kools, 2017).

Some thirty years ago Ronald Heifetz distinguished between technical challenges, problems that can be solved using existing knowledge, and adaptive challenges, ones that need substantial new learning and re-evaluation of existing behaviours (Heifetz, 1994). The changes required by most schools to make a reality of creative thinking in all aspects of the lives of their staff and students are in the second category, calling on adaptation and relearning.

Fragments of good practice

Perhaps unsurprisingly given the relative newness of creative thinking within schools, high-quality professional learning is thin on the ground. The countries and states featured in section 3 are beginning typically offer professional learning for leaders and teachers. Scotland's programme is a

good example of this³⁴. Where creative thinking is part of a national or state curriculum provision is strongest, for example in New South Wales in Australia³⁵. In Europe, where creative thinking is beginning to become an accepted transversal competence the Erasmus programme offers training courses³⁶.

Initial and pre-service teacher training

Across the world pre-service training for teachers tends to focus on the basics of literacy, numeracy and science, along with basic classroom craft and the priorities of particular educational jurisdictions. These two examples of pre-service training, one from the northern, one from the southern hemisphere, are relatively unusual:

- Creativity in Initial Teacher Education at the University of Cumbria, England³⁷
- Creativity, Learning and Teacher Artistry at the University of Sydney, Australia³⁸.

34 <https://education.gov.scot/improvement/self-evaluation/planning-for-and-evaluating-creativity/>

35 <https://education.nsw.gov.au/teaching-and-learning/professional-learning/priority-professional-learning/critical-and-creative-thinking-in-practice>

36 <https://www.erasustrainingcourses.com/creative-learning.html>

37 <https://www.cumbria.ac.uk/research/enterprise/tean/teachers-and-educators-storehouse/creativity/creativity-initial-teacher-education/>

38 <https://www.sydney.edu.au/units/EDUF3037>



Snapshot of the state of professional learning for creative thinking in schools

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.

7. CREATIVE THINKING IN SCHOOLS – AN AGENDA FOR CHANGE



Change will not come if we wait for some other person or if we wait for some other time. We are the ones we've been waiting for. We are the change that we seek.

Barrack Obama, Speech in Chicago, 5 February 2008³⁹

If the topic of this report, creative thinking, were a school student and this were her end of year school report it might read:

Over the last few years the student has made significant progress and her efforts have been widely appreciated. To realise her potential, she now needs to concentrate on curriculum design, pedagogy and assessment. Her biggest challenge will be the realisation of the scale of the challenge ahead and her willingness to focus on the professional learning needed to succeed in the years ahead.

In this final short section, all of the earlier snapshots are brought together. Where the snapshot 'dashboards' are red, the most changes are needed. All of the actions implied by our progress to date will form an agenda for action for the Global Institute of Creative Thinking (GloCT) and its partners in the coming years.

The reflections on the next page are shorthand only; in all cases both the progress made and the challenges ahead are, of course, more complex than these simple statements.






Next steps

Change will not come if we wait for some other person or if we wait for some other time, as the quotation at the start of this section reminds us. While, as the sections in this report bear testimony to, there has been significant progress by many brave and creative policy-makers and educationalists, there is much to do.

It is GloCT's hope that the examples from this snapshot report will offer practical inspiration to all of us who are trying to build a movement for creative thinking in schools.

³⁹ <https://www.nytimes.com/2008/02/05/us/politics/05text-obama.html>

Snapshots of progress

				
<p>The status of creative thinking</p> <p><i>Creative thinking is increasingly valued in school systems across the world.</i></p> <p><i>There is a growing consensus on some robust definitions and a small number of practical models in use across the world.</i></p>	<p>Curricula</p> <p><i>Creative thinking is increasingly specified in curricula across the world.</i></p> <p><i>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.</i></p> <p><i>Still only a minority of jurisdictions prioritise creative thinking in schools.</i></p>	<p>Culture, curriculum design and pedagogies</p> <p><i>There is a growing consensus on the school cultures needed to embed creative thinking.</i></p> <p><i>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.</i></p> <p><i>There is an emerging understanding of a range of pedagogies for creative thinking that can work in every subject of the curriculum.</i></p> <p><i>Many schools find that accountability pressures can be counter-productive in enabling creative thinking to flourish.</i></p>	<p>Assessment</p> <p><i>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.</i></p> <p><i>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.</i></p>	<p>Professional learning</p> <p><i>There is a growing recognition of the complexity and scale of changes needed at system and school level.</i></p> <p><i>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.</i></p> <p><i>Currently there is a huge unmet need for high-quality pre- and in-service training for teachers.</i></p>

APPENDIX 1 – CRITICAL & CREATIVE THINKING, ACARA

Critical and Creative Thinking learning continuum

Sub-element	Level 1 Typically, by the end of Foundation Year, students:	Level 2 Typically, by the end of Year 2, students:	Level 3 Typically, by the end of Year 4, students:	Level 4 Typically, by the end of Year 6, students:	Level 5 Typically, by the end of Year 8, students:	Level 6 Typically, by the end of Year 10, students:
Pose questions	pose factual and exploratory questions based on personal interests and experiences	pose questions to identify and clarify issues, and compare information in their world	pose questions to expand their knowledge about the world	pose questions to clarify and interpret information and probe for causes and consequences	pose questions to probe assumptions and investigate complex issues	pose questions to critically analyse complex issues and abstract ideas
Identify and clarify information and ideas	identify and describe familiar information and ideas during a discussion or investigation	identify and explore information and ideas from source materials	identify main ideas and select or clarify information from a range of sources	identify and clarify relevant information and prioritise ideas	clarify information and ideas from texts or images when exploring challenging issues	clarify complex information and ideas drawn from a range of sources
Organise and process information	gather similar information or depictions from given sources	organise information based on similar or relevant ideas from several sources	collect, compare and categorise facts and opinions found in a widening range of sources	analyse, condense and combine relevant information from multiple sources	critically analyse information and evidence according to criteria such as validity and relevance	critically analyse independently sourced information to determine bias and reliability
Generating ideas, possibilities and actions element						
Imagine possibilities and connect ideas	use imagination to view or create things in new ways and connect two things that seem different	build on what they know to create ideas and possibilities in ways that are new to them	expand on known ideas to create new and imaginative combinations	combine ideas in a variety of ways and from a range of sources to create new possibilities	draw parallels between known and new ideas to create new ways of achieving goals	create and connect complex ideas using imagery, analogies and symbolism
Consider alternatives	suggest alternative and creative ways to approach a given situation or task	identify and compare creative ideas to think broadly about a given situation or problem	explore situations using creative thinking strategies to propose a range of alternatives	identify situations where current approaches do not work, challenge existing ideas and generate alternative solutions	generate alternatives and innovative solutions, and adapt ideas, including when information is limited or conflicting	speculate on creative options to modify ideas when circumstances change
Seek solutions and put ideas into action	predict what might happen in a given situation and when putting ideas into action	investigate options and predict possible outcomes when putting ideas into action	experiment with a range of options when seeking solutions and putting ideas into action	assess and test options to identify the most effective solution and to put ideas into action	predict possibilities, and identify and test consequences when seeking solutions and putting ideas into action	assess risks and explain contingencies, taking account of a range of perspectives, when seeking solutions and putting complex ideas into action

Critical and Creative Thinking learning continuum

Sub-element	Level 1 Typically, by the end of Foundation Year, students:	Level 2 Typically, by the end of Year 2, students:	Level 3 Typically, by the end of Year 4, students:	Level 4 Typically, by the end of Year 6, students:	Level 5 Typically, by the end of Year 8, students:	Level 6 Typically, by the end of Year 10, students:
Reflecting on thinking and processes element						
Think about thinking (metacognition)	describe what they are thinking and give reasons why	describe the thinking strategies used in given situations and tasks	reflect on, explain and check the processes used to come to conclusions	reflect on assumptions made, consider reasonable criticism and adjust their thinking if necessary	assess assumptions in their thinking and invite alternative opinions	give reasons to support their thinking, and address opposing viewpoints and possible weaknesses in their own positions
Reflect on processes	identify the main elements of the steps in a thinking process	outline the details and sequence in a whole task and separate it into workable parts	identify pertinent information in an investigation and separate into smaller parts or ideas	identify and justify the thinking behind choices they have made	evaluate and justify the reasons behind choosing a particular problem-solving strategy	balance rational and irrational components of a complex or ambiguous problem to evaluate evidence
Transfer knowledge into new contexts	connect information from one setting to another	use information from a previous experience to inform a new idea	transfer and apply information in one setting to enrich another	apply knowledge gained from one context to another unrelated context and identify new meaning	justify reasons for decisions when transferring information to similar and different contexts	identify, plan and justify transference of knowledge to new contexts
Analysing, synthesising and evaluating reasoning and procedures element						
Apply logic and reasoning	identify the thinking used to solve problems in given situations	identify reasoning used in choices or actions in specific situations	identify and apply appropriate reasoning and thinking strategies for particular outcomes	assess whether there is adequate reasoning and evidence to justify a claim, conclusion or outcome	identify gaps in reasoning and missing elements in information	analyse reasoning used in finding and applying solutions, and in choice of resources
Draw conclusions and design a course of action	share their thinking about possible courses of action	identify alternative courses of action or possible conclusions when presented with new information	draw on prior knowledge and use evidence when choosing a course of action or drawing a conclusion	scrutinise ideas or concepts, test conclusions and modify actions when designing a course of action	differentiate the components of a designed course of action and tolerate ambiguities when drawing conclusions	use logical and abstract thinking to analyse and synthesise complex information to inform a course of action
Evaluate procedures and outcomes	check whether they are satisfied with the outcome of tasks or actions	evaluate whether they have accomplished what they set out to achieve	explain and justify ideas and outcomes	evaluate the effectiveness of ideas, products, performances, methods and courses of action against given criteria	explain intentions and justify ideas, methods and courses of action, and account for expected and unexpected outcomes against criteria they have identified	evaluate the effectiveness of ideas, products and performances and implement courses of action to achieve desired outcomes against criteria they have identified

APPENDIX 2 – CRITICAL & CREATIVE THINKING IN VICTORIA

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 solution.
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.

Foundation to Level 2	Levels 3 and 4	Levels 5 and 6	Levels 7 and 8	Levels 9 and 10
Meta-Cognition (continued)				
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.
Achievement Standard				
<p>By the end of Level 2, students use and give examples of different kinds of questions. Students generate ideas that are new to them and make choices after considering personal preferences.</p> <p>Students identify words that indicate components of a point of view. They use reasons and examples for different purposes.</p> <p>Students express and describe thinking activity. They practise some learning strategies. Students demonstrate and articulate some problem-solving approaches.</p>	<p>By the end of Level 4, students explain how to construct open and closed questions and use them for different purposes. Students select and apply techniques to generate a range of ideas that extend how problems are solved.</p> <p>Students describe and structure arguments with clearly identified aims, premises and conclusions. They use and explain a range of strategies to develop their arguments. They identify the need to make distinctions and apply strategies to make these.</p> <p>Students use concrete and pictorial models to facilitate thinking, including a range of visualisation strategies. They practice and apply an increased range of learning strategies, including visualisation, note-taking, peer instruction and incubation. Students select and apply a range of problem-solving strategies.</p>	<p>By the end of Level 6, students apply questioning as a tool to focus or expand thinking. They use appropriate techniques to copy, borrow and compare aspects of existing solutions in order to identify relationships and apply these to new situations.</p> <p>Students distinguish between valid and sound arguments and between deductive and inductive reasoning. They explain how reasons and evidence can be evaluated. They explain and apply basic techniques to construct valid arguments and test the strength of arguments.</p> <p>Students represent thinking processes using visual models and language. They practice and apply learning strategies, including constructing analogies, visualising ideas, summarising and paraphrasing information. Students disaggregate ideas and problems into smaller elements or ideas, develop criteria to assess and test thinking, and identify and seek out new relevant information as required.</p>	<p>By the end of Level 8, students prioritise the elements of a question and justify their selection. Students demonstrate flexibility in thinking by using a range of techniques in order to repurpose existing ideas or solutions to meet needs in new contexts.</p> <p>Students explain different ways to settle matters of fact and matters of value and issues concerned with these. They explain and apply a range of techniques to test the strength of arguments.</p> <p>Students use a range of strategies to represent ideas and explain and justify thinking processes to others. They evaluate the effectiveness of a range of learning strategies and select strategies that best meet the requirements of a task. Students independently segment problems into discrete stages, synthesise new knowledge at intermediate stages during problem-solving and develop and apply criteria to assess ideas, proposals and emerging thinking.</p>	<p>By the end of Level 10, students construct and evaluate questions, including their own, for their effectiveness. They demonstrate a willingness to shift their perspective when generating ideas, resulting in new ways of perceiving solutions.</p> <p>Students structure complex valid arguments. They explain and apply a range of techniques to test validity within and between arguments. Students identify, articulate, analyse and reflect on their own and others thinking processes. They use, monitor, evaluate and redirect as necessary a range of learning strategies. Students develop, justify and refine criteria to evaluate the quality of ideas, proposals and thinking processes.</p>

APPENDIX 3 -

EXTRACT FROM EDINBURGH'S 3-18 CREATIVITY SKILLS PROGRESSION

• EDINBURGH • THE CITY OF EDINBURGH COUNCIL 3-18 Creativity Skills: Progression Framework

Creative learners and creative thinkers are:

- constructively inquisitive, by:**
- being curious;
 - registering patterns and anomalies;
 - making use of previous knowledge, and researching productively; and
 - formulating good questions.

- open minded by:**
- using lateral thinking;
 - using divergent thinking;
 - hypothesising; and
 - exploring multiple viewpoints, and being flexible, adaptable and functioning well with uncertainty.

- able to harness imagination by:**
- exploring, synthesising and refining multiple options;
 - generating and refining ideas, and
 - Inventing.

- able to identify, solve problems by:**
- understanding and defining problems;
 - crafting, delivering and presenting solutions;
 - demonstrating initiative, discipline, persistence and resilience;
 - evaluating impact and success of solutions, and
 - identifying and implementing next steps in refinement or development process

able to apply creativity by: transferring creative processes to other situations, being motivated and ambitious for change, and confident in own views and opinions.

Entitlement	Early Level	First Level	Second Level	Third Level	Senior Phase
Children and young people can expect to develop as creative learners and creative thinkers with highly developed skills for learning, life and	I can recognise and describe visual and audio patterns and differences	I can recognise patterns and anomalies and can make up my own patterns	I can use my creativity and knowledge of different subjects to contribute ideas and make things on my own and in groups	I can demonstrate my creativity and apply the skills I have learnt across the curriculum	I can identify the skills I have learnt across the curriculum and can demonstrate my creativity appropriately in and out of school, during work placements and other work related learning
	I can express myself through play and making things	I can learn about the world through creative play and by making and presenting things	I can manage my profile and can use it to discuss my interests in and out of school with my parents/carers and others	I can identify my interests, strengths and skills and use them to make informed choices	I can research productively and make good use of my skills and knowledge to make choices about learning, pathways and career options

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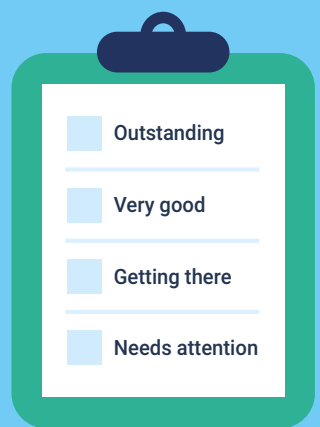
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NOTES

A series of horizontal dotted lines for writing notes, organized into two columns.



- Outstanding
- Very good
- Getting there
- Needs attention

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