CREATIVE THINKING:
Definition and Structure

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1 INTRODUCTION

In recent years there has been an increasing recognition that creativity and creative thinking should be fostered as valued outcomes of schooling, either in their own right, or as part of a set of so-called '21st-century skills' (Partnership for 21st Century Skills 2009; Griffin & Care, 2012; Kereluik et al., 2013; Adams, et al., 2015). While the importance of creative thinking is now widely accepted, it remains the case that there is a lack of agreement regarding a definition of creative thinking. Consequently, there is no universally adopted framework to guide its teaching and assessment. It is in this context that ACER has reviewed the extensive literature on creative thinking and developed both a definition and a framework that synthesise and harmonise existing theory and research on creative thinking. This framework has been developed to address the challenges associated with teaching and assessing creative thinking. The framework outlines creative thinking processes along prescribed *strands* and *aspects* informed by a sound evidentiary basis. The *aspects* contained within the framework are designed to provide foci for teaching and form the basis of assessment.

ACER's framework focuses on creative thinking rather than creativity. Some of the reasons for this are:

- creative thinking underpins creative output
- creative thinking strategies can be taught
- it is possible to focus on creative thinking as the key element in a task, whereas creativity tends to involve a hybrid set of skills.

ACER's creative thinking framework identifies key factors that underpin the development of creative thinking with a focus on observable skills and teachable creative thinking strategies. A main aim of this framework is to support the development of standardised assessments that can be delivered in the classroom and in doing so, support teachers in developing and evaluating students' creative thinking skills.

As a teaching and assessment resource, the ACER creative thinking framework presented in the subsequent section seeks to describe creative thinking both as generally applicable sets of skills, and as they tend to be operationalised in practice. The framework provides terminology in which the skill can be consistently described. The aspects can be used to write or map assessments items, or the aspects can be integrated into lesson plans. The skill needs to be embedded within the methodologies, conventions and 'ways of knowing' of each of the disciplines to give their application context, to ensure they are relevant, and that they can be sustainably integrated.

The full framework paper, which outlines the literature behind the framework can be accessed at https://research.acer.edu.au/ar_misc/40

⬡2 ACER'S CREATIVE THINKING FRAMEWORK

The assessment of creativity and creative thinking has typically been characterised in relation to the '4Ps' first identified in the 1960s (Rhodes, 1961). These 'Ps' are the person (personality features and dispositions of an individual), the process (the observable learning and thinking involved in a creative act), product (the end result), and press (the environment, including social factors). Researchers have tended to focus on one, at most, two of these aspects, and in doing so, align themselves with a particular research tradition, and manner of conceiving of creative thinking. ACER's model has a focus on the process of creative thinking, and the end product, with the knowledge that these features are observable and amenable to being measured using new techniques for standardised assessments that can be easily administered in the classroom.

In addition to having a different focus from some of the other frameworks reviewed, ACER's construct of creative thinking attempts to overcome the shortcomings of previous frameworks, most notably that they do not contain a sufficiently elaborated definition of creative thinking, or, where critical and creative thinking are combined, there is insufficient emphasis on the latter (ACARA, n.d.; Victorian Curriculum and Assessment Authority, 2018).

ACER defines creative thinking as:

> *the capacity to generate many different kinds of ideas, manipulate ideas in unusual ways and make unconventional connections in order to outline novel possibilities that have the potential to elegantly meet a given purpose.*

ACER's creative thinking construct is defined according to overarching strands, which are key skills or ideas that support creative thinking, and within that, aspects, which define how the strands might be assessed. ACER's creative thinking construct consists of three strands, including seven aspects in total, as depicted in Figure 1.

Strand 1   Generation of ideas

Creative thinking is, at its core, a generative process. This strand acknowledges the importance of the production of many different ideas, sometimes called ideational fluency (Guilford, 1950) to the process of creative thinking.

Aspect 1.1   Number of ideas

The research tradition of assessing creative thinking, in part, by a simple count of the number of ideas generated is extremely strong (e.g. Guilford, 1950; Torrance, 1966). While this aspect cannot speak to the quality of the ideas produced, the generation of ideas is a prerequisite for developing a creative solution. The inclusion of this aspect recognises that the more ideas are produced, the more likely it is that a truly creative idea will be among them. When a large number of ideas are produced, one or more could be combined to construct a creative product. While some researchers have argued that generation of ideas may be a domain-specific, rather than domain-general aspect of creative thinking (e.g. Han, 2003), it is likely to be possible to improve this issue by assessing creative thinking within more than one domain.

Aspect 1.2   Range of ideas

The notion that if a greater number of ideas is produced it is more likely that a creative one will be among them relies on the belief that distinct ideas will be produced. If many ideas are produced, but they share fundamental similarities, it is likely that the level of creative thinking exhibited by

each idea will be similar. Likewise, if a number of similar ideas is produced, it is less likely that they will be combined or synthesised to form a new idea or solution. This aspect explicitly addresses the number of *distinct* ideas presented. The concept of assessing both the number of ideas, as well as the number of different categories represented in a set of ideas was represented in the early, seminal work of Guildford on divergent thinking, and largely remains present in the modern forms of such assessments (Plucker & Makel, 2010), so has an established research history.
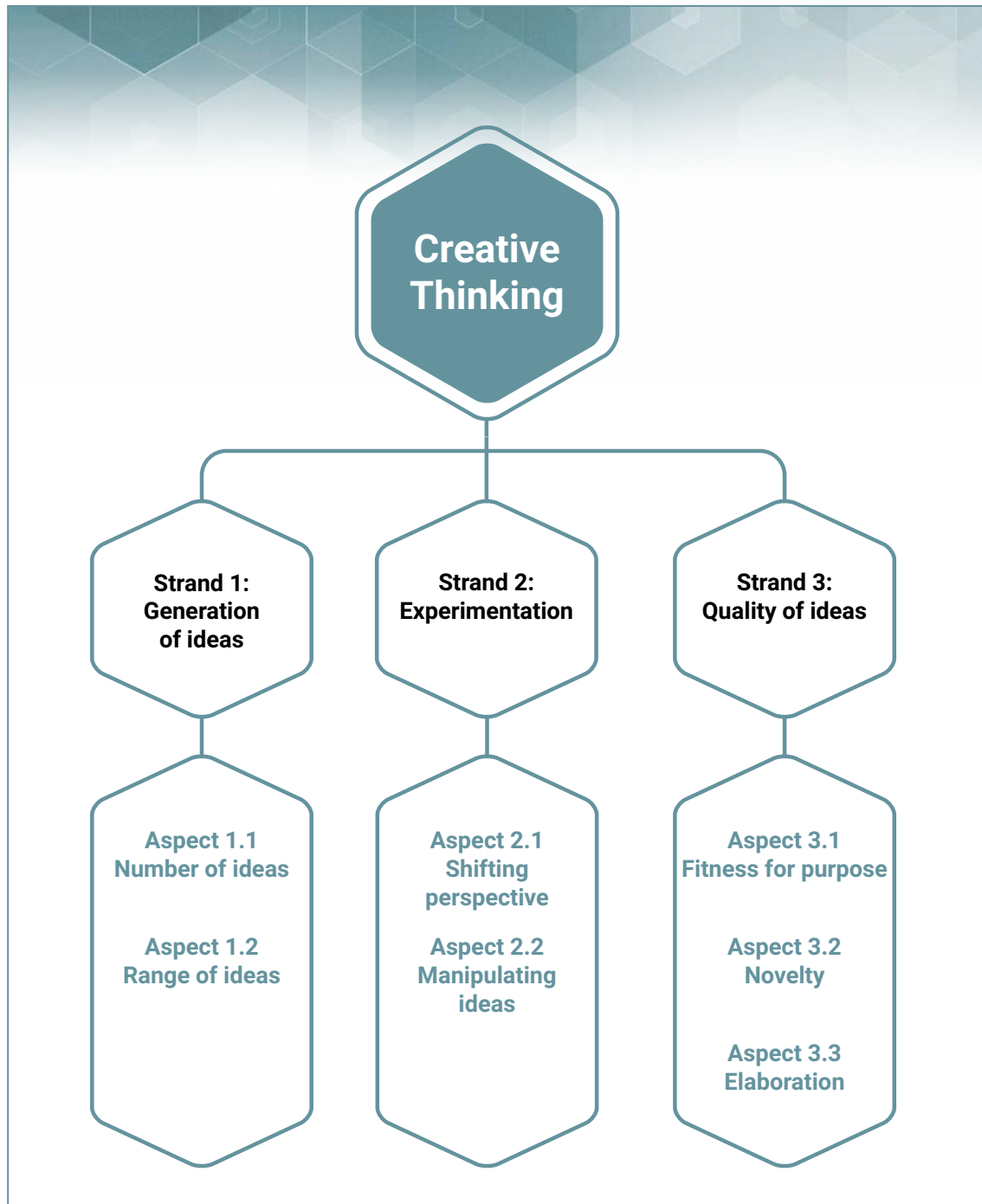
Figure 1 ACER's creative thinking framework

Strand 2   Experimentation

A key element of creative thinking is the ability to 'play' with ideas, both previously existing, and newly-generated. Critical to this process are the ability to consciously consider ideas from multiple perspectives, and to think creatively within the constraints of a task. This can lead to 'new' ideas in the form of processes such as adaptation and synthesis (Lassig, 2013).

Aspect 2.1   Shifting perspective

Creative thinking necessarily occurs within the constraints imposed in order to meet the purpose of the task. A challenge of creative thinking is to think flexibly enough to find novel ways to move within the constraints. However, we often constrain ourselves more than necessary. Creative thinkers consciously shift their own perspective of a problem in order to redefine the problem's context, and therefore come up with new ways to approach attempts to find a solution. A hallmark of creative thinking is that such perspective shifting is unconstrained by the conventional uses of objects or typical perspectives on ideas present in the problem context. In this way, creative thinkers act to overcome a form of cognitive bias called functional fixedness (Duncker, 1945) in which individuals only look at a problem from one perspective and simply do not see other possibilities.

The notion of being able to think creatively about the boundaries of a task, and how they might be moved, shifted or changed is reflected in the common phrase that creative thinking involves 'thinking outside the box'. Creative thinkers who demonstrate the ability to shift perspective typically ask 'what if' questions to renegotiate the boundaries of the known constraints of the problem context, and thereby open up new possibilities.

The willingness to actively shift perspective and consider new ways of seeing a problem is at least in part, related to disposition, since it involves an ability to suspend judgement, and tolerate uncertainty. Creative thinking may require individuals to keep an open mind, be willing to experiment and to consider and explore possibilities that may initially seem hopeless. Creative thinkers are willing to contemplate what may seem impossible and follow unlikely paths.

While other skills such as critical thinking and collaboration each also contain a notion of acknowledging other perspectives, this is generally in relation to identifying and addressing gaps in knowledge. In creative thinking, however, the ability to be flexible and see things from a different perspective is about seeing information that is already known, in new ways.

In order to think creatively, learners need to learn how to push the boundaries of a task to maximise the amount of creative thinking space. Conscious shifts in perspective can allow us to identify what aspects of a task can be changed.

These frameworks are described in ACER's full framework paper, which can be found at
https://research.acer.edu.au/ar_misc/40

Aspect 2.2   Manipulating ideas

Manipulating ideas requires flexible thinking. Creative thinkers know how to manipulate the elements of a task or prompt in different ways to generate new ideas. They combine, subvert, twist or graft elements together in unlikely ways to open up new possibilities and radically different ways of thinking about something. The inclusion of this aspect is an clear acknowledgment that creative thinking often involves adaptation or synthesis of existing ideas, rather than the generation of entirely new ones, a notion which is well-supported by research (e.g. Lassig, 2013).

Strand 3   Quality of ideas

Creative thinking does not exist in a vacuum. This aspect is about ensuring that the ideas generated are of high quality. Examining the appropriateness (or otherwise) of a solution is an idea that is present in most of the frameworks reviewed. A strength of the ACER approach is that not only is the importance of the solution as a creative product acknowledged, but the key features of a product that demonstrates creative thinking are specified.

Aspect 3.1   Fitness for purpose

While definitions of creativity are contested, there is fundamental agreement that it includes the notion of the end result being fit for purpose. Influential definitions have used the words 'appropriate' (Sternberg & Lubart, 1999) and 'useful' (Plucker et al., 2004) to express this idea. Fundamentally, this aspect acknowledges that creative thinking has a purpose, and if the end product is of no value, then if does not fully demonstrate creative thinking.

Aspect 3.2   Novelty

The idea that a creative product must be new is also fundamental to existing definitions of creativity (Plucker et al., 2004; Sternberg & Lubart, 1999). In the context of educational assessment, this key aspect remains important, but qualification is necessary. It is unlikely that students will generate an idea that is truly new, in the sense of it never having been generated before. As Smith and Smith (2010) have noted, however, an idea that is new to a student, even if not new in an absolute sense, can still be considered creative.

Generating novel or original ideas is relative to, and dependent on, the social context. For example, a student may generate ideas that are highly unusual in comparison with their classmates', but they may be similar to ideas generated in a different class. Ideally, students can work in a context in which the evaluation of the novelty or originality of an idea is generous enough that it provides opportunities for success while also challenging students to think differently.

This idea is of special importance in the case of young students, who have limited experience of the world and, consequently, a different perspective on what might constitute novelty. Many ordinary ideas may seem new in their eyes. They may also generate some ideas that are truly novel, with little capacity to differentiate these from commonplace ideas. Supporting creative thinking for young students will usually involve providing opportunities for experimentation and risk-taking with the teacher modelling the explicit valuing of unusual responses.

Aspect 3.3   Elaboration

Elaboration of an idea is about illustrating the richness of its potential to meet a given purpose. It may require providing detail when an idea might initially seem far-fetched in order to explain how it could potentially be effective. Elaboration gives substance to an idea, and acts to support its fitness for purpose.

While the level of detail in a response has not tended to be included in more recent frameworks, its importance was acknowledged in early work, with elaboration included as one of the response measures in the influential work of Guilford (1950).

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