

# Chapter 11

## Bush Kinders in Australia: A Creative Place for Outdoor STEM Learning



Coral Campbell  and Chris Speldewinde 

### 11.1 Introduction

Influenced by European and UK forest schools, Australian bush kinder programmes, are aiding in developing new approaches to early childhood education. Bush kinders take children outdoors, away from the regular indoor kindergarten premises and allow them to focus on the learning opportunities provided by nature. As these play-based sites of learning have grown (Christiansen et al., 2018), many educators have adopted ‘nature pedagogy,’ an approach to teaching in natural or ‘wild’ settings (Warden, 2015). The interaction with nature and the outdoors that bush kinders afford are beneficial for children, leading to improvements in long-term health, wellbeing and development (Elliott & Chancellor, 2014, p. 45). Bush kinders’ heavy grounding in the growing field of nature pedagogy (Warden, 2015) provides opportunities to observe how “an exploration of the natural methods and practice of working with nature... sit within a set of values” (Warden, 2015, p. 35).

Many of the learning opportunities bush kinders provide fall into holistic learning and can incorporate STEM, the arts, humanities and literacy experiences for Australian early years’ learners. Our research initially set out to understand how STEM learning occurs in the bush kinder yet we quickly became aware of how play offers opportunities for creativity. The children’s play exhibited creativity for example the children exhibited as they learnt about the world around them from the perspectives of science, technology, engineering and mathematics. It is evident that

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C. Campbell (✉)  
Deakin University, Geelong, VIC, Australia  
e-mail: [coral.cambpbell@deakin.edu.au](mailto:coral.cambpbell@deakin.edu.au)

C. Speldewinde  
Deakin University, Melbourne, Australia  
e-mail: [christopher.speldewinde@deakin.edu.au](mailto:christopher.speldewinde@deakin.edu.au)

creativity in children can be fostered from the early years via early childhood education (Craft, 2002; Kemple & Nissenberg, 2000) particularly as creativity facilitates children's whole development, a primary goal of early childhood education (Lowenfeld & Brittain, 1975).

Creativity, as defined in this chapter is influenced by Sternberg and Lubert (1995) who view creativity as being an ability to produce work that is both novel that is, work that is original, unexpected, imaginative and work that is appropriate that is, useful, adaptive and concerning task constraints. Creativity though, as Murcia et al. (2020) note, is complex. In this chapter, we focus on creativity generated through children's STEM experiences as the outdoor environment of the bush kinder provides strong opportunities in these areas.

This research sought to explore and gain insights into science teaching and learning in bush kinders. Through ethnography, we were able to observe and participate in the events such as those described later in this chapter, that were occurring around us. Through our ethnographic observations of science and more broadly STEM teaching and learning in bush kinders, we were able to identify a range of themes that included gender, place, pedagogy and creativity. Our experience of watching teachers and children's' creativity during bush kinder sessions drew us to posit two key themes to this chapter. Firstly, we explore how bush kinder environments provide multiple opportunities for children to develop their creativity that then enables solving of STEM problems. Then, we provide insights into how the environment enables children's creativity to develop, using current theories related to creative play. We address these two themes derived by applying research data from an ethnographic study. It takes in the voices of teachers through formal and informal interviews and observations of teaching and children's learning.

## 11.2 Understanding Creativity in Early Years Education

Creativity as an area of study is not new, with its origins dating back to the nineteenth century (Dovemark & Beach, 2014). Csikszentmihalyi's (1996) claim is that the term 'creative' originally meant "to bring into existence something genuinely new that is valued enough to be added to culture". Sternberg and Lubert (1995) define creativity as the ability to produce work that is both novel (original, unexpected, imaginative) and appropriate (useful, adaptive concerning task constraints). Creativity is now spoken about in terms of imagination, initiative and the unconventional (Dovemark & Beach, 2014, p. 99). Vygotsky's (2004, p. 7) notion that "any human act that gives rise to something new is referred to as a creative act" is influential as it is important not to dismiss any activity in the myriad of events which can be observed during fieldwork in an early years setting. Children's imagination is an important conduit to their creative output in real world situations. Vygotsky (2004, p. 13) confirms the importance of this connection between imagination and reality because, as he points out, "everything the imagination *creates* (emphasis added) is

always based on elements taken from reality”. The examples we provide later in this chapter, through teacher and our observations, allow us to see the child’s imaginings for uses of what nature provides in spaces like bush kinders. These imaginings become an outlet of creativity, particularly when it comes to children building an understanding of the natural world and their own place in it.

Cropley (2014, p. 7) comments that creativity is not limited to a select few and is far from a fixed, inborn trait. Taking away toys, dolls, sporting equipment and electronic gadgets, such as what we observed in the bush kinders, compels children to use what is available to them to play (Christiansen et al., 2018). What is available in the bush kinder are aspects of the natural environment—rocks, gumnuts, parts of trees, and other material—often called “loose parts” (Elliott & Chancellor, 2014; Nicholson, 1971) and more permanent natural structures such as trees, rivulets and hillsides. The context of the bush kinder allows children to conduct investigations that scaffold children’s learning and provides affordances to facilitate learning (Campbell & Speldewinde, 2020). Importantly for creativity, children can explore nature and its phenomena (Abdullah Mirzaie et al., 2009, p. 83) such as events associated with changing seasons, e.g. birds nesting, deciduous trees losing leaves, snow, that is both fun and interesting. The bush kinder takes the child away from the more structured approach of a formal kindergarten setting.

Kierwa and Veselack’s (2016) investigation of how creativity occurs in outdoor classrooms provides an important background to this study as it confirms how children problem solve and construct using the materials nature provides. They view creativity as being important in maximising human potential, a sense of well-being and making a positive change to society. They provide a list of necessary elements required to support the creativity of early years’ learners. There needs to be an array of natural materials; the capacity for children to ‘think for themselves’, problem solve, dream; have the capacity to move about freely and; have adults who support the children’s efforts (Kierwa & Veselack, 2016 p. 89). Bush kinders are often places with minimal design, other than what nature provides.

The Torrance test remains as one of the favoured measures of testing for creativity. Torrance’s test involves eight verbal and figural activities with written and oral responses that measure different creative abilities (Cramond et al., 2005, p. 283). Torrance’s original test sought to measure four different factors of creativity when children undertook a task: (a) fluency—the number of relevant responses to the task; (b) flexibility—the number of different categories or shifts in responses to the task; (c) originality—the number of unusual yet relevant ideas as determined by statistical infrequency; and (d) elaboration—the number of details used to extend a response to the task (Torrance, 1966, 1974, 1990). Torrance (1969 as cited in Abdullah Mirzaie et al., 2009, p. 82) viewed creativity as using a process of problem-solving, then looking for solutions, hypothesising, testing and evaluating. In testing creativity in outdoor settings we devised our own tool (Fig. 10.1). In addition, the framework that Murcia et al. (2020) developed, the ‘A’ to ‘E’ of Creativity, which draws together product, person, place and process to understand how children can be creative, was used in our analysis.

### 11.3 Understanding Bush Kinders: Influences on Children's Creativity

Outdoor environments have been found to be influential on symbolic play, more so than indoor environments due to natural materials and spaciousness (Shin & Frost, 1995). Natural environments provide “a richness and level of complexity that is impossible to duplicate” (Stephens, 2007 as cited in Ernst, 2014, p. 97). Bohling, Saarela and Miller (2010), in their study of outdoor learning spaces, argued that designed outdoor spaces allow children to have choice with what they play with. Bush kinders are a unique site of learning in the context of Australian early years learning. Those responsible for kindergarten provision view the bush kinder environment as one response to the Australian Government's policy directive that four year old children are required to be provided with 15 hours of ‘quality’ preschool per week (Campbell & Speldewinde, 2019; Elliott & Chancellor, 2014). From the existing literature and our own research, it is clear that the uniqueness of this context is captured by understanding that no bush kinder is identical to any other in its appearance, size, or affordances and opportunities for learning (Campbell & Speldewinde, 2019; Christiansen et al., 2018). Bush kinder environments are also unique in Australian context of early years education in as much as they occur in a multitude of different locations ranging from open paddocks, wooded parklands and beaches, each providing specific yet wide ranging opportunities for learning and creativity to develop.

Outdoor play and physical activity had been neglected in the latter decades of the twentieth century despite the affordances that outdoor environments provide children and adolescents for learning (Fjortoft 2004; Campbell & Speldewinde, 2019). Additionally, digital technologies have promoted more sedentary play types for all ages of children. Drawing on principles from the forest school approach and with impetus from the *Australian Early Years Learning Framework* (DEEWR, 2009), Bush Kinders have gained prominence as a reaction to the reduced interaction with nature and outdoor play opportunities.

Bush kinders provide an interesting example to apply to principles of creativity. Two recent frameworks, the *PISA Framework of Creative Thinking* (OECD, 2019) and the *A To E Creativity Framework* (Murcia et al., 2020) can be considered. The PISA framework has the following components: Generation of Diverse ideas, The Generation of Creative Ideas and the Evaluate and Improve ideas. These seem very similar to the Torrance factors of Flexibility and Fluency, Originality, and Elaboration (in that order). The *A To E Creativity Framework* (Murcia et al., 2020) provides the opportunity to consider the relationships between creative outcomes (product), the child who is doing the thinking (person), the resources, environment and communication occurring (place) and the creative thinking occurring (process). The analysis to come later in this chapter will integrate these process related concepts with those of Torrance to show how children's creativity is developed and demonstrated through their bush kinder experiences.

## 11.4 Observing Creativity in Play

We undertook a study across 2015–2017, and in 2020 with four bush kinder sites in the Sandy Shore Shire (pseudonym) of south-eastern Australia and were interested in understanding how creativity was understood and interpreted by the qualified teachers. All bush kinder field sites observed in this research had a lead teacher and teaching assistants. The teachers involved in this study were all very experienced, with many years of regular kindergarten classroom experience; however, their experience in bush kinder sites was limited to only a few years. Groups consisted of between twenty and twenty-five children. We applied ethnography to this study (Malinowski, 2014; Tashakkori & Teddlie, 1998, 2010), becoming participant observers, taking field notes both during and reflexively after our visits to the field and conducting individual teacher interviews over several periods, regularly returning to the field over a number of years. Originating in the discipline of anthropology, ethnography acts as a collection of research methods that provide ‘holistic accounts’ of institutional socio-cultural contexts and practices (Siraj-Blatchford, 2010, p. 271). If children’s experiences are to be understood then a need exists for ‘more ethnographic research, which can paint in the fine-grained reality of educational processes within early childhood settings’ (Siraj-Blatchford et al., 2001, p. 194). Ethnographic research involving children is helpful to understand evolving group memberships and dynamics (Corsaro & Molinari, 2000). In our research we were limited in how we could incorporate the children’s ‘voice.’ We could not interview the children as we were restricted by ethics to only observe the children and collect interview data from educators and children’s parents of their child’s bush kinder experience.

Having initially visited the bush kinders in 2015–2016 with the intent of understanding science and STEM learning and teacher pedagogy, we returned in 2017 and 2020 with a more directed focus on creativity. In 2017, we spent many weeks observing children’s play and noting children’s experiences that we would classify as demonstrating the Torrance factors of fluency, flexibility, elaboration or originality. For this, we devised an observation protocol, where we collected photographs as evidence of children’s creativity and noted details on the protocol. Following this, we wanted to know how the teachers viewed creativity in their approaches to STEM teaching and what it meant for the children to be creative in the bush kinder, so reviewed our earlier information on teacher pedagogy. We extended our study by further observing teachers’ pedagogy in relation to creative moments, but also by explicitly asked them for their interpretations of creativity and creative play.

## 11.5 Bush Kinder Environments: Providing Strong Opportunities for Children’s STEM Creativity

This section applies two sources of ethnographic data to allow for an understanding of the examples of creative STEM behaviour witnessed in the bush kinder and the teachers’ beliefs surrounding what creativity means in bush kinders. The first of these sources allows the reader to understand how we analysed the data using a protocol template. The raw data, a collection of anecdotes and observational notes, interview transcripts, video and audio data, were documented in a template according to the following flow chart. Then we provide examples from interview with teachers how show how teachers interpret creativity in bush kinders.

With the Observation Template to organise the raw data (Fig. 11.1) and ethnography as our research methodology that included observation, listening and video capture as tools for recording creative play, we recorded over 80 instances of creative play across 26 different bush kinder sessions. We searched for the four components of the Torrance Test (fluency, flexibility, originality and elaboration) evident in children’s play in activities such as construction, problem solving, and re-purposing of material and that we could categorise our raw data according to these components. Our observations included taking photographs and using the observation template that involved us at times sitting at a distance and on others being close to the activity occurring. We considered the influence of the teachers on this creative play and what the teachers’ beliefs were regarding how they were influencing creativity. As children utilised the materials available to them: fallen logs, trees, loose

**Creativity factors**

In the table below, describe an activity which illustrates the appropriate factor Site..... Date.....

<p><i>fluency</i>: the ability to produce a large number of ideas</p>	<p><i>flexibility</i>: the ability to produce a large variety of ideas</p>
<p><i>elaboration</i>: the ability to develop, embellish, or fill out an idea</p>	<p><i>originality</i>: the ability to produce ideas that are unusual, statistically infrequent, not banal or obvious</p>

**Fig. 11.1** Observation template

material, wooded and open spaces to initiate and conduct play, we began to observe the teachers through the lens of pedagogical approaches and the teachers’ own involvement themselves in this play.

### 11.6 Observing Creative Play Experiences

Developing the observation protocol was rhizomatic (Delueze & Guttari, 2004) in that it produced ‘a simplistic account of very complex and multifaceted phenomena’ (Strom & Martin, 2017, p. 26). It attended to, in a rhizomatic fashion, map connections and disconnections of instances of creativity between and across STEM pathways. We agreed upon the Torrance Test factors as a way to understand what we were witnessing in children’s play and how the children’s STEM learning was occurring. We examined many phenomena, as per the examples outlined in Fig. 11.1, that had occurred in isolation over time with the intent of showing how these STEM events were demonstrating the children’s creativity. Having taken dozens of photographs and pages of notes during and after the visits to the bush kinders, we set to analysing the data. From this earlier data analysis came a table (Fig. 11.2) that would allow incidences to be categorised. One ‘row’ from the table is provided here as a way of the reader understanding the way we came to understand the opportunities that were arising in the bush kinder. The table columns were devoted each bush kinder and rows to visits.

Within each row, the creativity events were listed then categorised according to their fluency (the children’s ability to produce a large number of STEM related ideas); flexibility (the ability to produce a large variety of STEM related ideas); elaboration (the ability to develop, embellish or fill out an idea) and; originality (the ability to produce ideas that are unusual, statistically infrequent, not banal or obvious).

Whitesands Bush kinder Shark beach, 9am-12pm	Chatlock bush kinder 8.30-10:00am or 10.30-11.30am	Wicklesham bush kinder 10.30am-Noon or 9:00 am-10:00am	Sunrise Bush Kinder Group A 8:45am -12:45pm	Jan Juc Bush Kinder Group B 8:45am -12:45pm
<p><b>22 March</b></p> <ol style="list-style-type: none"> <li>1. SCI -rock collection (colour, size), also CR – increased in size over an hour, (EL/FL)</li> <li>2. CR – sand drawing, started with house, added to drawing, (EL/OR)</li> <li>3. CR – sand drawing, use of directional arrows to lead to new drawing. (EL/OR)</li> <li>4. CR – sand drawing body outline (not done at kinder previously). Students collectively added faces and body parts, seaweed for hair. (OR/EL)</li> </ol>	<p><b>23 March</b></p> <ol style="list-style-type: none"> <li>1. CR – tree climbing. Unsticking oneself – (EL)</li> <li>2. CR – mixing mud. Dry, so mixed water from drink bottles. (OR / EL)</li> <li>3. CR- mixing mud, flattening so can draw on . (EL)</li> <li>4. CR – using a tree branch as a tool to pull down another branch to reach gum nuts. (OR)</li> <li>5. SCI – Gum nuts are animal (grub) homes – discovered when children opened them.</li> </ol>	<p><b>23 March</b></p> <ol style="list-style-type: none"> <li>1. CR- Preparing an animal home. Over time, the home is added to with grass and seedpods. (EL)</li> <li>2. SCI – children collecting millipedes, create ‘home’ for them.</li> <li>3. CR – building dens, forts from material – problem solving. (EL)</li> <li>4. CR – making choc cake with choc icing and selling them using grass as the money. (EL)</li> </ol>	<p><b>1 March</b></p> <ol style="list-style-type: none"> <li>1. CR- A small group began to run around making fire engine siren type noises. (OR)</li> <li>2. CR- Two boys found a long broken branch about 3 meters long and carried it around. Once it was back on the ground they tried to walk on it and the teacher mentioned ‘balance’. Teacher said ‘while your balancing the stick can go on the ground.’ (EL)</li> </ol>	<p><b>2 March</b></p> <ol style="list-style-type: none"> <li>1. CR- children running around pretending to be dinosaurs, making roaring noises. (FL)</li> <li>2. CR- Cubby house construction. (EL)</li> <li>3. CR- sticks hitting against other sticks of the cubby frame and listening to the different tones and noises. Teacher asks ‘why do you think it is making different sounds?’ as the children hits the sticks together. (EL/OR)</li> <li>4. SCI/CR Bullants as part of the space –how far do they walk, where do they go, look at what they are carrying. (FL/EL)</li> </ol>

Fig. 11.2 Aggregated data on creativity events



### 11.6.1 *Vignette – Sand Drawings/Body*

The three teachers and twenty children walked to the nearby beach (approximately 500 meters away) and after a short toilet and drink break, were given the freedom to use the environment for play. Two girls drew an outline of a body—bigger than themselves. The initial drawing (Fig. 11.3) was quite simple, but over time, and with time away from the drawing, the children returned three or four times to extend the drawing (Fig. 11.4). They added beach material to create facial features and seaweed for hair. The children were evidencing and depicting science awareness of body parts and features. In terms of creativity, the children were elaborating on an initial idea—so this example was recorded as EL for elaboration. Due to the large variety of ideas they had for filling in the body features, it was also tagged as FX—flexible. Discussion with the kinder teacher indicated that the children had not undertaken similar tasks as part of their kinder learning, so the experience was also tentatively suggested as an original idea the girls had.



**Fig. 11.3** Sand drawing: beginning





Fig. 11.4 Sand drawing: developing

### 11.6.2 *Vignette – Solving a Perplexing Problem*

When Sandy (pseudonym) arrived at bush kinder, she went to her favourite place to play. However, there was a small piece of torn animal skin and fur in her special place. She did not want it there! She did not want to pick it up with her hands either! After a few seconds looking at the fur, she left. I thought that she was going somewhere else to play but after a few minutes, she returned with two sticks from trees which she attempted to use as levers to lift the fur (Fig. 11.5). Her initial efforts did not work. One stick was too long and didn't allow her to manipulate it properly. She stopped for a few minutes and thought about her problem. She disappeared again and returned with two sticks of approximately equal length and tried again (Fig. 11.6). This time she successfully picked up the piece of fur and walked it about 20 metres away, to place into a bushy area. She returned to play in her own special place. This experience demonstrated an awareness of levers in science, properties of materials (rigidity of sticks), maths (equal lengths) and problem-solving. In terms of creativity, this was categorised as Sandy demonstrating an original idea.

When we classified our observations of the approximately hundred and twenty children across the bush kinder sites, we found that the creativity factor demonstrated the most was that of elaboration where children were able to embellish or develop an idea. Children demonstrated many original ideas—ideas that were unusual or at least unusual to them. Children's ability to produce a large number of ideas (fluency) or a large variety of different ideas (flexibility) was much lower.



**Fig. 11.5** Sticks as levers



**Fig. 11.6** Sticks as levers

### ***11.6.3 What the Teachers Said About Creativity***

In particular, place and person are of interest to us as bush kinder are places where toys and activities are removed from play in a bush kinder space and the children's learning and play is determined solely by what is available in the natural surroundings and the children's own imagination and creativity. As seasonal changes alter the environment, the opportunities for young children to observe and play within their surroundings also change. At the outset of building an understanding of how creativity was occurring in bush kinders, we sought to understand how the teachers defined creativity. Teachers were asked the question: "How would you describe 'Creativity' in bush kinders?" As we gathered the responses, we then sought to categorise the responses according to the Torrance test. Then as we spend more time at bush kinder, we began to frame our conversations with the Torrance test in mind. We wanted to know how the teachers viewed each of the four Test elements as sought responses in both interviews and during informal conversations. It was apparent that bush kinder teachers had distinct ideas about what was available in bush kinders to allow children to use creativity in their exploration of STEM concepts. To begin with we wanted to understand what creativity meant to bush kinder teachers:

To me I'd say imaginative play, imaginative play...

...the ability to actually be engaged the whole time they're out there without sitting.

...to me means finding all those amazing, natural, loose parts...

I think creativity is really prompting the kind of science...(Lucy)

We came to understand from these teacher comments that creativity had several meanings—engagement in the space by the children, the children's discoveries in nature and, confirming Vygotsky's (2004) notion, the children's use of their imagination in how they interacted with the bush kinder space. Our study began with a science learning focus, so we also sought to understand the connections teachers were making between creativity in bush kinders and science learning, one teacher remarked that:

I think they're also creative in how they find out about their world; they know what to do how to look. They know to actually even look for things, rather than ignore them. (Allie)

With this in mind, we analysed how teachers viewed creativity in terms of fluency, flexibility, elaboration and originality.

#### **11.6.3.1 Fluency**

When it came to children creatively using the bush kinder space, the teachers were able to point to STEM play and learning that we could categorise according to their ability to produce a large number of ideas. Example such as, how children could purpose a large fallen log or use a group of feathers found on the ground showed that children can apply their imagination and develop different ideas to a resource

nature has provided. Ideas that involved STEM learning which included balancing on large logs much like that of a seesaw but minutes later that same log became a rocket or airplane as different children transition in and out of one space in the bush kinder. At the next session, a week later, the log became an icecream shop. Often the same materials would be repurposed. As one teacher identified with the influx of birds at the bush kinder that:

We've got an enormous number of feathers this year, we've got corellas everywhere and they're dropping white feathers everywhere. So we've had little hairdressing salons where the children have been using feathers in children hair and making Indian headdresses. (Amanda)

What becomes apparent is that nature's characteristics of the bush kinder and the resources available allow children to become fluent in the ideas that develop.

### 11.6.3.2 Flexibility

Teachers, when asked about children's ability to produce a variety of ideas, could identify flexibility as apparent in bush kinders. In one instance, a teacher saw that there were "no boundaries (unless there is a safety concern)" (Allie). The children were able to experiment and flexibility would allow for children to "pose questions and encourage different ideas. To listen and to accept all ideas and explore them"(Amanda). For example, over the duration of the research, we often observed creativity through children's cubby or play houses being imagined and constructed spontaneously. These play houses came in a variety of locations within the bush kinder space and used a variety of materials. At times, simply being under the canopy of a large tree was a play house. At other times, teams of children would cooperate to gather materials and then erect structures using fallen tree limbs and sticks and leaves. An adjacent fence became the permanent structure for yet another playhouse. The notion of a dwelling for play was one that produced a variety of ideas in the location and materials which were applied. On occasions, flexibility could be viewed as children would often roll on the ground. At times on the ground and at other times one teacher alerted us to their discussion with children:

where they were starting from [rolling down the hill], some were starting at the midpoint of the hill whereas others where starting at the top. (Mary)

This discussion stimulated conversation between teacher and children about the physical science of force. It created a variety of ideas, again demonstrating flexibility in creativity, about the direction the children rolled, the topography of the land (was it flat or sloping?), how their body shape influenced rolling (did being curled up in a ball or stretching out influence their rolling?), and the surfaces on the hill (the amount of vegetation and avoiding small trees when rolling downwards).



### 11.6.3.3 Originality

Because much of bush kinder's activity involves only what nature provides and few artificial or fabricated materials, children are often left to repurpose only what is available in a bush kinder space. Children's engagement with nature and developing STEM understandings requires ideas that appear unusual or not obvious. The teachers were regularly surprised by the way children would develop ideas to problem solve. Play was open-ended, which enhanced opportunities for creativity (Cropley, 2014) and one teacher noted that "...original ideas are in abundance" (Allie).

This does mean that children become attuned to their environment. Originality was regularly required to overcome the obstacles nature puts in place such as how to climb a large tree. One teacher, indicating how originality was applied, noted that the children were:

...looking at where they put their feet and find out the best way to get to the highest point of the tree. (Samantha)

Being able to negotiate their way up a tree led to the children coming up with novel way to climb, supporting each other and ensuring they did not fall down from high branches. The teachers themselves, initially reluctant to let children climb due to being risk-averse, eventually realised that not allowing children to climb was in fact stifling their creativity and STEM learning.

We came to realise that we needed to allow the children to climb so they could learn to be safe. They had to be creative in how they climbed to ensure they were safe. (Mary)

Imaginary play begins to incorporate elements of STEM including mathematics that was initially not obvious and demonstrated the originality of the ideas being produced as maths began to interact with fairies and dinosaurs:

There was a lot of maths in there with sizes and shapes like fairy rings and things like that. Just the different layers of it, and even to fairies. There was fairies came up in it as well, 'oh that's a good fairy house'. (Samantha)

Or.. if you think of an example of Jack.. last year they'd always make a dinosaur nest every Bush Kinder session. So they'd have to build the tower that contained the nest, they'd have to find something that would be the egg. (Allie)

### 11.6.3.4 Elaboration

Bush kinders foster children's ability to take an idea and embellish it or develop. Children become attuned to changes in the environment around them that are instantaneous and seasonal. Being able to take ideas prevalent in STEM is an important element of developing creativity. As one teacher noted, bush kinders force children to:

Ask 'why?' They explore the change in seasons. [They explore and want to understand] dirt changing into mud. (Samantha)

Returning to children's rolling down a hill, a teacher indicated that:

In the Bush Kinder, we talk about ways the children roll down the hill and how some are going faster than others. (Allie)

The educators at times will scaffold play if deemed to be appropriate. Ideas are embellished when facts are sought to identify found bugs, insects, spiders and birds. Educators will support:

filling out an idea if seen as needed to extend children's ideas and play. (Samantha)

A further example is that with the children, teachers will:

Explore what we can see e.g. mud drying up. Where does the water go? (Amanda)

## 11.7 The Environment as an Enabler of Children Creativity and Creative Play

Simon Nicholson (1971, p. 30) in his paper *How NOT to Cheat Children – The Theory of Loose Parts* commented that “In any environment, both the degree of inventiveness and creativity, and the possibility of discovery, are directly proportional to the number and kind of variables in it.” He suggested was that materials that can be moved around, designed and redesigned, and tinkered with—provide more opportunities for creative engagement than static materials and environments. Basically, the more materials there are the more children can interact with them, and each other. The environment of the bush kinder, whether it be bush, beach or open grasslands, is instrumental in enhancing children's creative play. The open-ness of the studied environments allowed for multiple interpretations of the materials on the sites and an almost immeasurable number of ways these materials could be used. For example, sand could be collected, piled, shaped, drawn on, added to, decorated, covered up and re-purposed (Fig. 11.7). A large tree limb could be a horse, a plane, a seat (Fig 11.8), a boundary, part of a cubby (Fig 11.9), a balance beam (Fig. 11.10)—unbounded by notion of ‘treeness’.

## 11.8 Rethinking Creativity Using Different Frameworks

Sometimes it can be limiting to analyse information from one perspective, so we looked back at our data with new lenses. One of these was the application of the *A to E of Creativity Framework* (Murcia et al., 2020), the other was looking at the new PISA ‘Creative Thinking Framework’. Due to its similarity to the Torrance creativity factors, and the fact that it is designed for older children, we chose not to use the PISA Framework and we limited our re-visioning only using the *A to E of Creativity Framework*



**Fig. 11.7** Sand drawing



**Fig. 11.8** Tree limb as a train





**Fig. 11.9** Constructing a cubby house



**Fig. 11.10** Tree limb as a balance beam

### ***11.8.1 Children's Creative Play Experiences***

In reviewing our 80 examples of children creative play experiences, we found that they did indeed fall into the two categories suggested by Murcia et al. (2020). Children's play was either original (aligned with Torrance's factor of 'original') or 'fit-for-purpose' where children were deliberately and intentionally engage in play that had imaginative or creative features (aligning with many instances of flexibility, fluency and elaboration). In the instances we recorded, most were related to children's creative doing or creative thinking.

### ***11.8.2 Teachers' Pedagogy Related to Creativity***

Research in pre-school classrooms has shown that teachers can adopt strategies for fostering creativity (Abdullah Mirzaie et al., 2009; Beetlestone, 1998). These strategies then become reliant on the teacher's proficiency in fostering the creativity, leading to a need for creativity training or discipline focussed training for example science-based training. There were some instances of teachers engaging children in creativity. In many cases, this exhibited itself in the scaffolding provided to the children through suggestions and questions to enhance their curiosity or promote further child exploration. Much of the teacher's pedagogy was enabled by the bush kinder setting and this linked into the 'place' notion in the *A to E Creativity Framework*

### ***11.8.3 The Environment as an Enabler of Creativity***

Both the children's creative ideas and the teacher's scaffolding of the creative play relied on the environment of the bush kinder. The bush kinder is an open environment with many materials which allow re-interpretation. There are no external materials brought into the bush kinder, so there are no pre-existing expectations of children's play. In considering the *A to E Creativity Framework*, aspects such as the resources (stimulating and adequate for all) link to children's enhancement of creative play. Teachers' and children's communications were open, with a valuing of children's ideas and learning conversations with others. The environment was non-prescriptive, with no gendered expectations or judgements made. For all children, bush kinder appeared to be value-free.

## 11.9 Concluding Comments

Our research initially set out to understand how children's interactions with teachers was influencing creative play and whether teachers were aware of creativity when it came to their planning and programming of children's learning in bush kinders. To assess creativity, we applied the key creativity components used in the Torrance Test for Creativity to our data (Torrance, 1966), leading to us developing a template of four creativity components by which individual creativity could be observed: fluency, flexibility, elaboration and originality.

We observed multiple examples of children displaying different creativity factors during play and interrogated how the teachers were viewing this. Our study highlighted that although teachers did not know the theoretical aspects of creativity, they recognised when children were demonstrating creativity. Often teachers linked creativity with imagination and this is a valid connection. According to Robinson (2011) imagination is considered the source of creativity where creativity involves putting your imagination to work. Teachers demonstrated a capacity to move into play to scaffold a creative instance as well as raise questions which might prompt further play. The extensive time spent in bush kinders observing play, through the lens of creativity, highlighted that bush kinders in Australia are a creative place for outdoor STEM learning.

Moving forward, as bush kinders continue to grow and flourish, opportunities will develop to further explore how children's creativity is fostered in and by the natural environment. Our research emphasised STEM teaching and learning but other learning domains can be explored. The Arts, Social Sciences such as Geography and Indigenous studies, and literacy all have their place in fostering children's creativity. The environment has already proven to be an enabler for children's creativity. Bush kinders provide an exciting challenge to educators as each site is different, no bush kinder is the same. The result of this is that each bush kinder comes with its own opportunities for teaching and challenges for teachers to develop their teaching to suit each site. There is no 'one size fits all' approach to bush kinder, what can be said is that bush kinders are a place for creative outdoor STEM learning.

## References

- Abdullah Mirzaie, R., Hamidi, F., & Anaraki, A. (2009). A study on the effect of science activities on fostering creativity in preschool children. *Journal of Turkish science education*, 6(3), 81–90. <http://www.tused.org/index.php/tused/article/view/127>
- Beetlestone, F. (1998). *Learning in the early years: Creative development*. Scholastic.
- Bohling, V., Saarela, C., & Miller, D. (2010). *This never would have happened indoors: supporting preschool-age children's learning in a nature explore classroom in Minnesota*. [https://www.dimensionsfoundation.org/wp-content/uploads/2016/07/skillsforestkmn\\_10.pdf](https://www.dimensionsfoundation.org/wp-content/uploads/2016/07/skillsforestkmn_10.pdf)
- Campbell, C., & Speldewinde, C. (2019). Bush kinder in Australia: A new learning 'place' and its effect on local policy. *Policy Futures in Education*, 17(4), 541–559. <https://doi.org/10.1177/1478210317753028>

- Campbell, C., & Speldewinde, C. (2020). Affordances for Science learning in “Bush Kinders”. *International Journal of Innovation in Science and Mathematics Education*, 28(3), 1–13. <https://doi.org/10.30722/IJISME.28.03.001>
- Christiansen, A., Hannan, S., Anderson, K., Coxon, L., & Fargher, D. (2018). Place-based nature kindergarten in Victoria, Australia: No tools, no toys, no art supplies. *Journal of Outdoor and Environmental Education*, 21, 61–75. <https://doi.org/10.1007/s42322-017-0001-6>
- Corsaro, W. A., & Molinari, L. (2000). Priming events and Italian children’s transition from preschool to elementary school: Representations and action. *Social Psychological Quarterly*, 63, 16–33. <https://doi.org/10.2307/2695878>
- Craft, A. (2002). *Creativity and early years education*. Continuum.
- Cramond, B., Matthews-Morgan, J., Bandalos, D., & Zuo, L. (2005). A report on the 40-year follow-up of the Torrance tests of creative thinking: Alive and well in the new millennium. *Gifted Child Quarterly*, Fall 2005, 49(4), 283–291. <https://doi.org/10.1177/001698620504900402>
- Cropley, D. (2014). Fighting the slump: A multi-faceted exercise for fostering creativity in children. *The International Journal of Creativity and Problem-solving*, 24(2), 7–22. <https://psyc-net.apa.org/record/2014-48681-002>
- Csikszentmihalyi, M. (1996). *Creativity: Flow and the psychology of discovery and invention* (pp. 107–126). Plus Notes. HarperCollins.
- DEEWR (Department of Education, Employment and Workplace Relations). (2009). *Belonging, being and becoming: The early years learning framework for Australia*. In *Australian Government Department of Education, Employment and Workplace Relations for the Council of Australian Governments*. Commonwealth of Australia. [https://www.acecqa.gov.au/sites/default/files/2018-02/belonging\\_being\\_and\\_becoming\\_the\\_early\\_years\\_learning\\_framework\\_for\\_australia.pdf](https://www.acecqa.gov.au/sites/default/files/2018-02/belonging_being_and_becoming_the_early_years_learning_framework_for_australia.pdf)
- Deleuze, G., & Guattari, F. (2004). *A thousand plateaus: Capitalism and schizophrenia translation and foreword by Brian Massumi*. Continuum.
- Dovemark, M., & Beach, D. (2014). Creativity learning in schools: A meta-ethnographic analysis. *Knowledge Cultures*, 2(3), 98–117. <https://www.ceeol.com/search/article-detail?id=411170>
- Elliott, S., & Chancellor, B. (2014). From forest preschool to bush kinder: An inspirational approach to preschool provision in Australia. *Australasian Journal of Early Childhood*, 39(4), 45–53. <https://doi.org/10.1177/183693911403900407>
- Ernst, J. (2014). Early childhood educators’ preferences and perceptions regarding outdoor settings as learning environments. *International Journal of Early Childhood Environmental Education*, 2(1), 97–125. EJ1108039. ERIC. <https://files.eric.ed.gov/fulltext/EJ1108039.pdf>
- Fjørtoft, I. (2004). Landscape as playscape: The effects of natural environments on children’s play and motor development. *Children, Youth and Environments*, 14(2), 21–44. <https://www.jstor.org/stable/10.7721/chilyoutenvi.14.2.0021>
- Kemple, K. M., & Nissenberg, S. A. (2000). Nurturing creativity in early childhood education: Families are part of it. *Early Childhood Education Journal*, 28, 67–71. <https://doi.org/10.1023/A:1009555805909>
- Kierwa, C., & Veselack, E. (2016). Playing with nature: Supporting preschoolers’ creativity in natural outdoor classrooms. *The International Journal of Early Childhood Environmental Education*, 4(1), 70–95. <https://naaee.org/eepro/research/library/playing-nature-supporting-preschoolers>
- Lownefeld, V., & Brittain, W. L. (1975). *Creative and mental growth* (6th ed.). MacMillan.
- Malinowski, B. (2014). *Argonauts of the Western Pacific: An account of native enterprise and adventure in the archipelagoes of Melanesian New Guinea with a foreword by Adam Kuper*. Routledge.
- Murcia, K., Pepper, C., Joubert, M., Cross, E., & Wilson, S. (2020). A framework for identifying and developing children’s creative thinking while coding with digital technologies. *Issues in Educational Research*, 30(4), 1395–1417. <http://www.iier.org.au/iier30/murcia2.pdf>
- Nicholson, S. (1971). How not to cheat children, the theory of loose parts. *Landscape Architecture*, 62(1), 30–34. <https://media.kaboom.org/docs/documents/pdf/ip/Imagination-Playground-Theory-of-Loose-Parts-Simon-Nicholson.pdf>



- Organisation for Economic Co-operation and Development (OECD). (2019). *PISA 2021 creative thinking framework (third draft)*. <https://www.oecd.org/pisa/publications/PISA-2021-creative-thinking-framework.pdf>
- Robinson, K. (2011). *Out of our minds: Learning to be creative* (2nd ed.). Capstone Publishing Limited (Wiley).
- Shin, D., & Frost, J. L. (1995). *Preschool children's symbolic play indoors and outdoors*. Unpublished doctoral dissertation, University of Texas.
- Siraj-Blatchford, I. (2010). An ethnographic approach to researching young children's learning. In S. A. Rolfe, G. MacNaughton, & I. Siraj-Blatchford (Eds.), *Doing early childhood research: International perspectives on theory and practice* (pp. 271–289). Allen & Unwin.
- Siraj-Blatchford, I., & Siraj-Blatchford, J. (2001). Doing early childhood research. In G. McNaughton, S. Rolfe, & I. Siraj-Blatchford (Eds.), *Doing early childhood research: International perspectives on theory and practice* (pp. 193–207). Open University Press.
- Sternberg, R. J., & Lubart, T. I. (1995). *Defying the crowd: Cultivating creativity in a culture of conformity*. Free Press.
- Strom, K. J., & Martin, A. D. (2017). *Rhizomatic inquiry. In Becoming-teacher. Imagination and praxis: Criticality and creativity in education and educational research*. Sense Publishers. [https://doi.org/10.1007/978-94-6300-872-3\\_3](https://doi.org/10.1007/978-94-6300-872-3_3)
- Tashakkori, A., & Teddlie, C. (1998). *Mixed methodology: Combining qualitative and quantitative approaches*. SAGE.
- Tashakkori, A., & Teddlie, C. (Eds.). (2010). *SAGE handbook of mixed methods in social & behavioral research* (2nd ed.). SAGE.
- Torrance, E. P. (1966). *Torrance tests of creative thinking. Norms-technical manual. Research edition. Verbal tests, forms A and B. Figural tests, forms A and B*. Personnel Press.
- Torrance, E. P. (1974). *Norms-technical manual: Torrance tests of creative thinking*. Ginn & Co.
- Torrance, E. P. (1990). *Experiences in developing creativity measures: Insights, discoveries, decisions*. Unpublished Manuscript, Torrance Center for Creative Studies and Talent Development, University of Georgia.
- Vygotsky, L. S. (2004). Imagination and creativity in childhood. *Journal of Russian and East European Psychology*, 42(1) January–February 2004, 7–97. <https://doi.org/10.1080/10610405.2004.11059210>
- Warden, C. (2015). *Learning with nature: Embedding outdoor practice*. SAGE.

**Coral Campbell (PhD)** is a Professor at Deakin University where she is a specialist science/STEM educator and researcher. She is involved with industry-partners, the Department of Education and Training, schools, teachers and educators through research, professional development, and student programs. Coral's research encompasses science/STEM education in early childhood, primary and secondary settings and she has published in a wide selection of academic and professional journals and books, with over 150 publications. Coral instigated and co-edited a text *Science in Early Childhood*—the first of its type in Australia and now on its fourth edition. She is also co-editor of a further four academic books and texts. Coral is a member, and former Director, of the Australasian Science Education Research Association. She is the current Early Childhood Science Special Interest Group Coordinator (with E. Blanquet) for the European Science Education Research Association and is the Research Fellowship Committee Chair for the Association of Graduates in Early Childhood (AGECS).

**Chris Speldewinde** is undertaking a doctorate at Deakin University that examines the Australian bush kinder pedagogy and STEM learning. Chris has several academic and practitioner publications regarding bush kinders. He is a sessional lecturer and works in multi-university projects investigating issues in education. He has interests in teaching out of field, policy/governance in education and, early/primary school education.