

TEACHING WITH TECHNOLOGY: Up, Up And Away With Parachutes In Primary Mathematics



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If you like taking your mathematics lessons outdoors then you will enjoy this issue's technology column! Maria Northcote and her students suggest a variety of different technologies and mathematical explorations that can be used in conjunction with a parachute.

Introduction

> It is of utmost importance that what is already known about young children's healthy growth and development is applied to the use of new technological developments (Lentz, Kyeong-Ju Seo & Gruner, 2014, p. 22).

In a teacher education institution just north of Sydney, a lecturer asked her students about their most vivid memories of learning about mathematics in their primary school years. By far, the most easily recalled positive experiences of mathematics involved some form of physical activity or the use of hands-on resources:

> One day the teacher organised for us to have a pizza party. The pizzas were divided into even pieces and we learned about fractions.
>
> I loved the way my teacher got us to use the things she found around her house in the classroom. She'd bring them into our class and we'd use them in maths activities.
>
> We did cooking in our primary school class. I'm not sure if it was meant to be a maths lesson or not but we learned how to measure, how to cut up food into parts and how to estimate amounts.
>
> We did maths activities with parachutes. I really enjoyed that. We were all running around, laughing, counting and just doing maths.

Not only was the enjoyment clear in their voices but they were also able to easily identify the learning that had occurred. It follows as no surprise that research studies continue to reinforce the value of using physical resources and physical activities to optimise learning outcomes. In primary school mathematics, the physicality associated with a lesson is often the key to children developing a strong conceptual understanding of a mathematics topic.



Figure 1. Pre-service teachers at Avondale College of Higher Education preparing for mathematics parachute games (photograph: Jasmin Bell, 2014).

By using hands-on equipment and resources in authentic and purposeful activities, children's learning about mathematical concepts can be firmly grounded in a mixture of sensory experiences and cognitive understandings (Reys et al., 2012).

Activities which involve the use of physical activities have been shown to benefit children's fitness, movement, concentration, cognitive functions and social skills (Bouffard et al., 1996; Cosentino & Wyrzkowski, 2007). In more recent years, Prensky (2001) has been reminding us that we are in the 21st century and that children are digital natives of this new era; they naturally use all types of online and offline technology. However, the overuse of technology as a focus of play and enjoyment in more recent years has seen the time spent by children on physical activities diminish (Lentz et al., 2014; Rosen et al., 2014). While some uses of technology during indoor and outdoor learning experiences can be incorporated into physical activities, an over-reliance on screen-based resources can promote more sedentary behaviour patterns.

A mixture of physical and movement-based activities in conjunction with technological resources can provide opportunities for physical and technological education of primary school students to be interconnected. For example, Goodwin (2008) found that the use of virtual manipulatives actually enhanced kindergarten children's understanding of mathematics. Similarly, by using screen-based resources to teach third grade students about fractions, Reimer and Moyer (2005) found that the students' learning and their enjoyment of learning significantly improved.

While parachute activities in primary schools have long been used to provide opportunities for children to develop a range of knowledge and skills that are not necessarily mathematical in nature, the use of parachutes can also contribute to the quality and enjoyment of children's mathematical learning. For these reasons, the physical activities described in this article are also linked to activities that can be conducted with the use of online, computer and hand-held technologies.

Mathematics with parachutes and technology

Playground parachutes have been used inearly childhood (Richards, 2010; Wilmes & Wilmes, 2000) and primary education (Strong & LeFevre, 2006) for many years to develop cooperative skills, conduct music activities and develop language competencies, not to mention the use of parachutes in physical and movement activities.



Figure 2. Playing dice games using a playground parachute. Pre-service teachers at Avondale College of Higher Education (photograph: Jasmin Bell).

The use of a playground parachute in indoor and outdoor activities in primary schools can also facilitate mathematical learning in all strands of the *Australian Curriculum: Mathematics* (Australian Curriculum Assessment and Reporting Authority [ACARA], 2013) including Number and algebra, Measurement and geometry, and Statistics and probability.

The following table provides a collection of mathematics activities that can be used with a playground parachute and mobile technologies to initiate physical activities and games. For the convenience of curriculum planning, each activity has been referenced to a strand and substrand of the *Australian Curriculum: Mathematics* (ACARA, 2013). Technology can be used to both supplement and reinforce the learning that occurs in these physical activities.

Table 1. Mathematics activities using a playground parachute and technological resources.

Strand	Substrand	Activities using a playground parachute and technological resources
Number and algebra	**Number and place value.** **Fractions and decimals.** **Patterns and algebra.**	**Addition and subtraction:** Place two foam dice on the parachute and instruct children to add up or subtract the numbers on dice faces. **Counting:** Place a light ball on the parachute and ask children to estimate how many times they can get the ball to roll around the centre circle or around the far edges of the parachute. **Counting down:** Practise lifting the parachute up and down, by counting down from 5 or larger numbers. **Number recognition:** Place a ball on the parachute. Tape numbers around the circumference of the parachute and, as each number is called out, children aim to roll a ball towards that number. **Online games**: such as Skip Counting with Pictures: http://au.ixl.com/math/year-1/skip-counting-with-pictures. **Online interactive number board:** www.abcya.com/interactive_100_number_chart.htm. **Full part nature of fractions:** Folding the nylon parachute to show halves (two layers), quarters (four layers) etc. **Equivalent fractions:** Use folding activity above to demonstrate the equivalence of fractions (e.g., one half = two quarters). **Even and odd numbers:** Allocate each child an even or odd number. As a group, children call out skip counting sequences using odd and even numbers. Hold the parachute high while children with even numbers run into the centre, shake hands with each other and run back out to hold onto the edge of the parachute. Repeat with odd numbers. **Random number generator:** www.oswego.org/ocsd-web/games/RndGenerator/rndnogen.html. **Online big calculator:** www.amblesideprimary.com/ambleweb/mentalmaths/BigCalculator.html. **Pattern recognition:** Children count aloud the various coloured segments and the numbers of each of the parachute sections, and verbalise their sequence. **Online quiz:** Create online quizzes based on pattern matching and guessing activities using Quiz Boxes: http://quizboxes.com.

Strand	Substrand	Activities using a playground parachute and technological resources
Measurement and geometry	**Using units of measurement.** **Shape.** **Location and transformation.** **Geometric reasoning.**	**Time:** Tape numbers from 1–12 around the parachute to simulate a clock-face. Children run to an o'clock time, based on the use of a spinner. **Informal/formal measurement of length:** Estimate and measure (with footsteps, trundle wheels) the distance across and around the parachute. **Time estimation:** Estimating how long it would take for a child to walk around the parachute in regular, baby or giant steps. **Online stopwatch:** on iPhone, iPad or laptop: www.online-stopwatch.com **Virtual spinner:** http://www.mathsisfun.com/data/spinner.php **2-D shapes:** Describe shapes that make up the parachute (circle, triangle segments). **Mobile phone/iPad app:** Shape Builder – the Preschool Learning Puzzle Game: https://itunes.apple.com/au/app/shape-builder-preschool-learning/id306572986?mt=8) **Directions:** Children follow directions around, above, below, near the parachute. **Movement:** Children run around one rotation of the circle in anti-clock-wise direction, then in a clockwise direction. **Online barrier games:** such as the Tasty Ice Cream app which allows children to build a virtual ice cream, putting ingredients on top, under, in the middle, etc. **Angles:** Compare angles created by colour divisions or by folding the parachute. **Online angle measuring tool:** such as www.teacherled.com/resources/anglemeasure/anglemeasureload.html. **Digital cameras:** to record 2-D and 3-D shapes in context of school grounds.
Statistics and Probability	**Chance.** **Data representation and interpretation.**	**Prediction and chance games:** Rolling foam dice on the parachute. **Collect data:** about how long it takes individual children to run around the parachute or how the number of times a foam die rolled on the parachute lands on a 1, 2, 3, etc. **iPad or tablet:** to record data in columns, based on their occurrence. **Online dice:** e.g., www.curriculumbits.com/mathematics/virtual-dice. **Online polling system:** such as Poll Everywhere: www.polleverywhere.com to record outcomes of data collection activities.

Conclusion

The mathematics activities described in this article suggest a combination of hands-on physical resources and technological tools to teach mathematics concepts to primary school-aged children (Goodwin, 2008; Kissane, 2009; Reys et al., 2012; Swan & Marshall, 2010). The use of technological tools such as cameras, stopwatches, audio recorders, iPad apps and interactive whiteboard games can be used before the parachute game activities, during the parachute activities or to reinforce learning after the parachute activities have taken place. These interactive activities provide opportunities to introduce new mathematical concepts, to build on current knowledge and to extend children's understanding of mathematics while giving them the chance to be active and social.



Figure 3. Mathematics Activities using Playground Parachute. Pre-service teachers at Avondale College of Higher Education (Photograph: Jasmin Bell).



Figure 4. Shaking Hands Mathematics Activity using Playground Parachute. Pre-service teachers at Avondale College of Higher Education (photograph: Jasmin Bell).

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