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Title of chapter/article	Teaching with Technology: Step Back and Hand Over the Cameras! Using Digital Cameras to Faciliate Mathematics Learning with Young Children in K–2 Classrooms
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Copyright owner	The Australian Association of Mathematics Teachers (AAMT) Inc.
Published in	Australian Primary Mathematics Classroom vol. 16 no. 3
Year of publication	2011
Page range	29–32
ISBN/ISSN	1326-0286

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TEACHING WITH TECHNOLOGY



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explores the use of digital cameras as a tool for handing over control of a mathematics lesson to the children. While the children were very young, the results were extremely impressive!

Step back and hand over the cameras! Using digital cameras to facilitate mathematics learning with young children in K-2 classrooms

Every afternoon for three weeks, the teacher lent a digital camera to one child in the class to take home overnight. The children were asked to take photographs of mathematics taking place in their lives and the lives of their family. After the three week period ended, the teacher had a child-centred bank of authentic mathematics examples that could be used in the classroom in a variety of ways. These authentic photographic resources were created by the children in her class and included everyday objects and situations to which the children could relate. As well as showing her how the children in her class perceived mathematics, this activity gave the teacher an insight into gaps in the children's knowledge and provided an ideal starting place for her future teaching.

Digital cameras are now commonplace in many classrooms and in the lives of many children in early childhood centres and primary schools. They are regularly used by adults and teachers for "saving special

moments and documenting experiences” (Pastor & Kerns, 1997, p. 42). The use of previously expensive photographic and recording equipment has often remained in the domain of teachers, who have produced innovative digital products for children to use and for teachers to “facilitate the collection of accurate evidence for assessment purposes” (Boardman, 2007, p. 59). However, more and more teachers of young children in current digitally-equipped classrooms are handing over the cameras to their students, with beneficial results. As well as providing opportunities for learning in art, language, science and physical education, digital cameras are proving to be versatile tools that can be used to facilitate mathematics learning and teaching in K–2 classrooms.

Why?

When your principal or the parents of the children in your class ask why you are using digital cameras in your mathematics teaching and why you are handing the cameras over to the children in your class, here are a few ideas with which to answer such inquiries.

Handing over cameras to young children can increase their level of ownership and interest in the process of learning about mathematics. Children become “young ethnographers” who use cameras to record, share and extend their learning experiences (Richards, 2009). These processes also promote collaborative learning, questioning and discussion among children about mathematics concepts.

In a way, handing over cameras to young children in mathematics classrooms is akin to handing over technology to those who know best; the “digital immigrants” are putting the technology into the hands of the “digital natives” (Prensky, 2001) which may even reduce the “digital divide” (Zevenbergen & Logan, 2008) created by the difference in the teacher’s knowledge and the children’s knowledge about technology. The children

can teach their teachers about how to use digital cameras.

Using technology, such as digital cameras, can facilitate the process of learning about mathematical concepts (Yelland, 1999), as long as the technology is developmentally appropriate. However, teachers should take care not to use overly abstract representations of everyday objects before children are ready for such a step. For example, using photographs of spherical objects before children are familiar with concrete spherical materials may be an inappropriate teaching sequence. Even so, photographs of circular objects can assist children to make the link between drawings of circles and everyday objects.

The familiarity of digital cameras and the photographs that children take with digital cameras can help to make mathematics more accessible and meaningful to young children. Focusing lessons, activities and games around photographs taken by children (Campbell & Scotellaro, 2009) provide them with a familiar context in which to situate their mathematics learning.

Examples

The use of digital cameras with young children can help to facilitate learning processes and the production of learning products. Here are a few examples where digital cameras can be used as tools in the mathematics classroom.

‘How-to’ records

Children can be guided to take photographs of the sequential steps involved in a particular classroom project, such as baking a cake, measuring a desk or going on an excursion. These photographs can be used to facilitate children’s learning about time concepts including sequencing, time duration and time-telling. Sequential photographs can be used to trigger activities like writing number stories. These ordered photographs, with

attached child-created mathematical content, could then be compiled into a book for future classes of children to access.

Graphing

Instead of collecting and representing data about theoretical situations, children could take photographs of each other's shoes and hair colour to graph on a column or pictorial graph.

Space and geometry

Instead of using commercially produced pictures and photographs, use the photographs taken by children in your class to teach the concepts of symmetry, and parallel, vertical and horizontal lines. These photographs can be enlarged by using the photocopier or the interactive whiteboard. Printed versions of these photographs could be laminated to make the resources re-usable.

Maths journal

Children can be encouraged to write journal entries about their own mathematics photographs or interpret the photographs of others in relation to particular mathematics concepts (such as addition, subtraction, counting, shape, position, chance and graphing). The mathematics journal can also be used as a helpful assessment strategy for teachers to track children's progress and achievements.

Shape identification

Use photographs taken by children in your class as the basis of an activity in which children identify and name circles, squares, triangles and rectangles in pictures. Photographs could be projected onto an interactive whiteboard to enlarge them to represent lifesize objects for children to trace over and digitally manipulate..

Counting

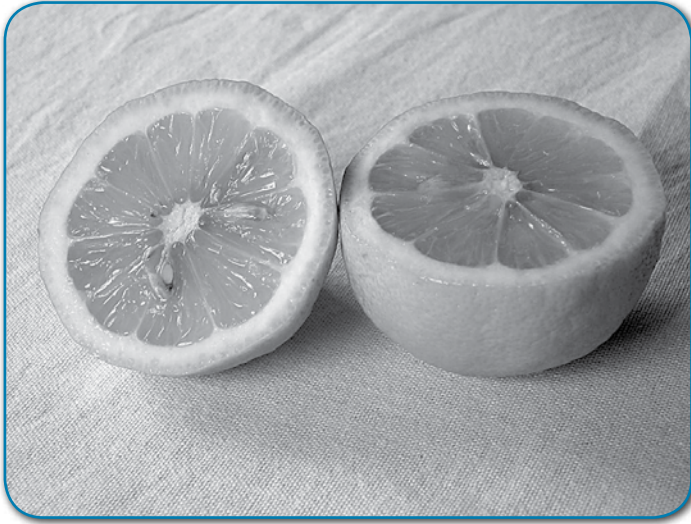
Ask children to take photographs of collections of objects in their home, playground or neighbourhood. They can bring photographs

back to school of their brothers and sisters, collections of their favourite toys or food, or groups of items in their backyards or playgrounds. These photographs can form the basis of future lessons about addition, subtraction, multiplication and division processes.

Game resources

Photographs taken by children can become the basis of materials used in mathematics games to facilitate children's ability to subitise. For example, a photograph of a collection of 7 items can be made into a card which matches another card showing the numeral 7 or 7 dots. These cards can be combined to create a set of memory cards in which children can practise the process of matching photographs of objects, with numbers of dots and matching numerals.





Prior knowledge

Teachers can hand over digital cameras to children in order to determine the prior knowledge held by children in their class about particular mathematical concepts. For example, asking children to take photographs of half and whole objects can provide insight into their understanding of fractional parts.

Conclusion

Handing over the cameras to children in your class can increase participation in classroom activities to a level where children are valued as active contributors to the classroom learning environment. By using familiar

objects and situations through photographs, the cognitive load sometimes associated with children interpreting unfamiliar content can be reduced. The mathematics concepts and learning can become the focus of your lessons, instead of spending time getting accustomed to using unfamiliar items, and the children experience the joy of being integrally involved in their mathematics lessons. With digital cameras in their own hands, children become contributors and collaborators in their own learning.

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