

# YOUNG CHILDREN TAKING PICTURES OF TECHNOLOGY AND SCIENCE

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## ABSTRACT

This study was undertaken in a rural two-teacher primary school (years 1-8) to explore children's perceptions of technology and science. Children were each given a single-use camera to photograph examples/instances of technology and science at home, at school and in the community. Interviews were undertaken with the children about their photographs. A community exhibition of the children's photographs was held. Teachers and parents were also interviewed about the study. The photographs provided a unique insight into children's ideas about technology and science. Children taking and talking about photographs of technology and science opened up conversation to provide rich insight into children's understandings of technology and science in their world.

## 1. INTRODUCTION

Recently there has been a call for new tools to extend our understanding of young children's perspectives (Clark and Moss, 2001; Fler and Robbins, 2003), including the use of multiple methods. Research methods that incorporate the visual are being recommended because children live in a visual culture and visual representations pervade their lives (Prosser, 1998). Auto-photography and photo-interviews provide a distinctive qualitative voice, with the method working from pictures to words and not vice versa. The objective of this study was to explore the potential of auto-photography and photo-interviews to elicit children's ideas about technology and science. Children's views of technology and science are of interest given the role that is envisaged for these two disciplines in the 'knowledge society'. Since the work of Chambers (1983), children's views of scientists have been elicited using the 'Draw-a-scientist-test'. Children's views of technology have also been elicited through drawing (Moore, 1987). Only one study was found that elicited children's views of science through the alternative means of photography (Settlage, 2000). Other aims of this study were to encourage children to make connections with their everyday world and to foster community debate about the nature of technology and science.

A sociocultural perspective on learning underpinned the study. The perspective endorses the view that knowledge is socially constructed and that activity is mediated by the tools people use and nested in wider social, cultural, political and economic contexts (Wertsch, 1991). People are viewed as members of multiple communities who learn different ways of participating in the world, with these then shaping their sense of who they are, where they belong, and who they want to become. Seen this way, children's experiences in and out of school shape their understandings about who can be, for example, a technologist/scientist and the contributions each makes to society, or not. This

framework allows the exploration of the links children make between school and their everyday lives and supports the use of a variety of tools to engage thought.

Photographs have value in society. Children have seen family members take, pore over and talk about photographs. Photographs can portray, describe and analyse culture (Harper, 1997; Rubin and Cohen, 2003). Auto-photography, in which the children themselves take the photographs, provides children with another means to represent their ideas, one that may complement verbal and written language (Clark and Moss, 2001; Dodman, 2003). Auto-photography has been used with success by children to generate information on their view of school (Schratz and Steiner-Loffler, 1998) and on their view of self (Ziller, 2000). As a tool, a camera focuses attention on some aspects of experience and not others and taking a photograph involves the selection of some data and the exclusion of other data. They embody multiple levels of intention and meaning. In this sense, all images are socially and technically constructed and so the context of each photo is of interest (Fasoli, 2003). For this reason it is important for research purposes to find out the intentions of the photographer (Walker, 1994). Photo-interviews serve this function.

## **2. DISCUSSION**

In the study reported here, all the children (38) in a rural two-teacher year 1- 8 school participated in the research. Each was given a fifteen-exposure, single-use camera for the purpose of taking photos of technology and science. The camera's disposability meant there was no need for concern from either the children or their families about damaging expensive equipment. These cameras were also selected because they were relatively straightforward to operate, were light, compact and produced high quality photographs. The children were given brief instructions about how to use the camera, and provided with a pictorial overview of instructions for taking a photograph and a sheet for recording what they were attempting to photograph. The record sheet prompted the children to take 15 photos, one of themselves and then fourteen others. All cameras were returned and the photographs developed. The children were interviewed about their photographs. A community exhibition was mounted where we spoke to parents about the impact and worth of the process.

The results are discussed in two sections. The first section is related to the nature of auto-photography and photo-interviews as qualitative research methods. The second section pertains to the children's ideas about technology and science.

### **2.1. Auto-Photography And Photo-Interviews As Qualitative Research Methods**

Auto-photography allowed research 'with' rather than research 'on' children. The children took photographs without our direct involvement; they were in control of the camera. Each child took a sample photograph practising how to frame an object and take a photograph. The practice photographs were developed and returned promptly to give children feedback about their use of the camera. All children were able to use the camera successfully.

In our verbal instructions to the children we were careful not to engage in explanation of what might be technology and science. The children were encouraged to take photographs at home, at school and in the community. We asked the children to include a picture of them as the first photograph so that we could easily identify who had taken each set of photographs. Parents usually took these but six children held the camera at arms length and photographed themselves. The children were very pleased with their self-portraits and often identified these as their favourite. The children in our study were

clearly excited by the opportunity to have their own camera. Four of the youngest children went outside and took some shots on the way to putting their camera in their school bag. One mother reported that her child had taken all 15 photographs before she got home.

The children took the task seriously whereby they searched out specific items and instances to photograph. Some children even staged photographs, for example photograph 1.



1: Ross's balloon

Some children asserted they had taken their photographs on their own. Indeed, some parents expressed surprise, and pleasure, at the independence that their children had shown. Other children sought help to set up photographs. Sarah (a year 2 child) said my dad helped me get things out and got me set up. Photograph 2 shows Liam's Mum helping.



2: Liam's dog and Mum's shadow

Family members were involved in the children's taking of photographs at home. For example, Natalie (year 6) told us that she thought children should seek assistance. She said do it with someone who knows a lot so you get what they think. Kerry (year 2) had photographed cupboard doors as 'science' because her father advised her to.

Some researchers may view the photographs the children took as biased data because of the influence of others. As researchers working within a sociocultural framework we view all data as constructs developed through the relationship of the researcher, research participants, research context, and means of data generation. To us the children's familiarity with the camera and confidence in taking photographs was a particular strength of the research process. The camera is a medium that appeals to young children and provides a form of communication that is fun (Clark and Moss, 2001).

As photographs are an evaluation of the world (Sontag, 1997) it is important for research purposes to find out the intentions of the photographer. In our study each child was involved in a photo-interview the week after they handed in their camera. The short timeframe was important to maintain interest and to increase the chances of children remembering what they had photographed and why. Like the taking of photographs the

children took the photo-interview seriously. Owen (year 1) asked did I get it right? Harriet (year 5) insisted that both researchers interview her. She wanted our joint undivided attention.

The photo-interview time was the children's first viewing of their photographs. In talking with the younger children it became apparent that first and foremost many of them had photographed what was important to them. This included their family, friends and pets, for example photograph 3.



3: John's cousin

The children had not always composed the photograph in a way that made it obvious what it was intended to picture (Fasoli, 2003). This confirmed for us that it is important to talk to them about their intentions when seeking to make sense of a photograph. For example, photograph 4 is of the light on top of the grader, not the grader itself.



4: Sue's light

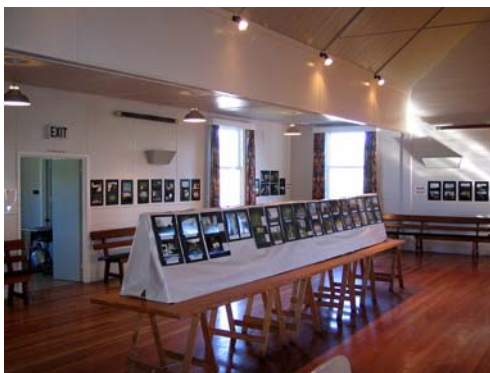
In some cases children were surprised by what was in their photographs. An appealing example of this was the photograph of Tamsen's younger sibling hidden under the table and the toaster (photograph 5). Tamsen knew that her sister wanted to be photographed but she had not realised that her sister was under the table when she took the photograph of the toaster.



5: Tamsen's sister and the toaster

James was also surprised when he first saw his photograph of a video. He said oh look - I've got the TV and the speakers and the CD and the computer and the DVD. I only wanted the video.

Photographs can be an effective way to get people's attention and engagement in an idea or project; they can be 'welcome and accessible way into someone else's experience' (Haviland, 2004, p. 3). We held an exhibition of the children's photographs in the local community hall so that children with their families could come together to acknowledge what the children had achieved. Each child had two self-selected photographs displayed. The commentary they had dictated to us was displayed alongside their photographs. An afternoon show was held in school time so all of the children could see their work (photograph 6 shows the hall ready for the exhibition). The static display was complemented by a data show of the photographs. During the data show excited whispers filled the air (photograph 7).



6: The exhibition in the hall



7: Watching the data show

After the data show the children were free to view the display. They carefully examined each other's photographs and read the captions. An evening viewing was held to provide an opportunity for the community to view the photographs. Ten of the 28 families attended.

Teachers and parents were unanimous in the benefits of children using a camera and photographs to explore and explain their ideas of technology and science and believed that the process itself was valuable to the children. The giving of the camera and the asking of children to take photographs affirmed the children as thoughtful and having opinions that matter. Two parents of 6 year olds reported that all 15 photographs had been taken before the parents arrived home. The kids just went for it. Linda's mum tried to help but was relegated by Linda to the role of recorder. Another parent had been concerned about her child having a camera but she was completely confident. Another said that he'd helped with the setting up but was not involved with decisions about what to take. Liam's mum made a point of telling us that although Liam could not tell her what technology and science were he confidently took photographs of both. When she asked him how did he know what to take, he replied I just looked. Gary, the principal stated:

"I loved that kids had opportunities to go out and that they could take photos even when they didn't have the language. They could use the photographs to explain. They could go out and find what they wanted to take. Not mum or dad's ideas, their own ideas".

It seems to us that the taking and viewing the photographs had a 'can-opener effect' (Walker, 1994) in opening up conversation around technology and science. The photographs worked in this way as a research tool and as a focus for discussion between

children and their families. When asked to draw children tend to produce stereotypical images of technologists/ scientists. Through auto-photography children produced a range of images to show technology and science in their world. However, this raised ethical issues to do with the disclosure of children's home circumstances. We sought consent for the exhibition photographs over and above the research consent because these images were to be viewed in an open forum.

## 2.2. Children's Ideas About Technology And Science

We were interested in children's ideas about technology and science and so we asked them to sort their photographs into sets that showed 'technology' or 'science' to gain an insight into their ideas (Walker, 1994). Children who were six or older generally grouped their photographs into two sets. Typically, one set was of machines or appliances powered by electricity and the other included living things – plants, people and animals. Fourteen of the thirty-eight children confidently categorized their photographs and gave clear reasons for the categories. Eight of the eleven five and six year-old children struggled to articulate any criteria for how they had divided their photographs. Sometimes, as they attempted to describe what a set had in common, they became aware of the contradictions in their classification and re-sorted their photographs. For example, they might re-sort so that plants (trees, shrubs and grass) and vegetables (bananas) were in the same set. The technology/science divide was not useful for eight of the thirteen ten- to thirteen- year-old children. As they were sorting their photographs and explaining their reasoning they developed a combined 'science and technology' category.

We found the sorting and explaining activity a useful way of focusing our discussion with the children because they could talk about their technology and science ideas using their own photographs. We gained deeper insight into their thinking while watching them undertake the sorting process and listening to their explanations of what they were doing and why.

As with all research, the interpretive process begins with the set up of a study. In our case our instruction to the children to take photographs at school, home and in the community reflected our view that technology and science exists outside school and that children appreciating this was important. In keeping with our desire to value work with children, our data analysis followed on from their categorization and explanations. The predominant reason given by children of all ages for their classification of photographs as technology was because what was depicted used electricity, power and/or had plugs or connecting wires. For example:

Dad's car engine is technology because it has electricity in it. (Sally, year 1)

"They are all run by cords and have special technology in them like little chips; chips that help them and cords that are connected". (Beatrice, year 5)

"My brother's toy is to do with technology because it has got lights that flash on it. It's got a missile that shoots out. It's got a pack on the back and you press it. It needs a battery for the lights". (Adam, year 8)

Only six children explained that people made technology. For instance Helen (year 3) explained: *These are technology because man made them. A technologist would build fax machines and phone machines and lots and lots of things.*

We derived six categories for the photographs the children classified as technology. All of the children, except one who only took science photographs, included at least one

photograph in each of the following four technology categories: communication technologies (e.g. TV's, stereos, video players, DVD's, cell phones, fax machines – photograph 8), household electric appliances and items (e.g. microwaves, washing machine/dryers, lights, clocks), farm machinery (e.g. tractors, farm bikes, chestnut deburrer, pasture dry-matter monitor, sprayer – photograph 9) and vehicles (e.g. cars, motorbikes, bicycles). Another category was toys where two boys had photographed toys that used batteries. The final technology category was non-electrical goods. Ten children had photographs in this category.



8: Communication (Jen's computer)



9: Farm machinery (Liam's tractor)

The predominant reason given by children of all ages for their classification of photographs as science was because what was depicted were living things, nature and/or growing. For example:

The dog is my favourite. This is Lily. She is science. She is growing. (Liam, year 1)

"Clouds, the birds, the grass and me are all nature science. They are science because they are part of nature. Nature is like when you grow stuff, it is like living things". (Lydia, year 3)

I'm a growing thing and that's nature science. (Rochelle, year 6)

Nine children talked about the weather as being science; six children talked about foods as science and eight children talked about science-in-action. Adam (year 8) informed us that *leaping is science because of gravity. It's jumping in the air*. Ross (year 7) said *I threw the balloons in the air and then took the photo. It floats and that's science – how it floats*. Five children (from two families) talked about the reaction between baking soda and vinegar as science. Harriet (year 5) told us that *it is scientific when baking soda and vinegar communicate and form together. It exploded everywhere*.

We derived seven categories for the photographs the children classified as science. All of the children, except three who only took technology photographs, included at least one photograph from each of the following three categories: plants (e.g. trees, grass, flowering shrubs, pot plants); animals (e.g. farm animals and pets – photograph 10); and people (e.g. family members, body parts). Other categories were weather, food, science-in-action (photograph 11), and experiments.



10: Jamie's cat



11: Karen's sister jumping

The children's photographs depicted a range of technology and science aspects. This in contrast to the stereotypical images of technologists/scientists children usually draw. Through auto-photography and the photo-interview children were able to present a comprehensive representation of technology and science in their world. The children's talk in the photo-interviews was expansive, as it was augmented through their photographs.

### 3. CONCLUSIONS

This study has shown that auto-photography is an accessible technique for helping children represent their ideas, one that is less dependent solely on written and spoken language and allows for more student control and ownership within the research process.

The act of photographing requires 'putting oneself into a certain relation to the world that feels like knowledge – and, therefore, like power' (Sontag, 1973, p.4). It was important that the children took more than one photograph. Taking fifteen photographs meant the children were able to provide multiple responses, thus avoiding a simplistic interpretive response based on a single image. Taking and then examining their photographs were both important parts of the research process the children and for us. Researchers talking with children about the children's photographs led to a genuine conversation about the children's interests and ideas. Through the photo-interviews, the children were able to experience adults listening and responding to them about what they thought and saw. The photo-interview was central to helping us understand their intention. Auto-photography and photo-interviews bypassed the need for the technical and artistic skills required to draw a scientist / technologist and the communication skills and understandings required to respond to a direct question what is technology/science.

There has been an increase in interest in public understanding of technology and science. It is now recognised that 'ordinary' citizens need to make judgements about matters underpinned by technological capability or science knowledge (Hodson, 2003; Millar and Osborne, 1998). The goals advocated for technology and science education encompass outcomes that include the skills, knowledge and attitudes that will lead children to become lifelong learners who are active and informed participants in a democratic society. The photographs taken by the children in this study show they were able to identify technology and science in their worlds. But more than this, auto-photography opened up home-school collaboration. The children's photographs were a useful tool for stimulating discussion and conscripting others into the research process. The level of family interest and involvement generated by this project was a significant if unexpected outcome. The processes of taking and talking about the photographs, and mounting and viewing the exhibition served as catalysts for community discussion about technology

and science. The research process made a genuine contribution to family involvement in the children's learning about technology and science in their lives. For us, it has raised new research questions to do with how children taking photographs about technology and science could be used as a means to engage the wider school community in conversations about technology and science. For us auto-photography and photo-interviews newly exposed the issues and challenges inherent in qualitative research with young children, especially the need for the research process and the researcher to be open to the unexpected and surprising.

Note: A fuller version of this research can be found in Moreland, J. and Cowie, B. (2005) Exploring the methods of auto-photography and photo-interviews: Children taking pictures of science and technology, *Waikato Journal of Education*, 11(1), 73-88.

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