

EXPLORING THE METHODS OF AUTO- PHOTOGRAPHY AND PHOTO- INTERVIEWS: CHILDREN TAKING PICTURES OF SCIENCE AND TECHNOLOGY

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ABSTRACT *In this paper we discuss the methods of auto-photography and photo-interviews. The benefits and disadvantages of using these methods with young children are examined in relation to a photographic study we conducted in a rural two-teacher primary school (years 1-8) to explore children's perceptions of science and technology (Moreland & Cowie, 2004). Combined, the photographs and the photo-interviews provided a unique insight into children's thinking about science and technology. They proved useful for accessing different viewpoints, as children took photographs at school, at home and in their communities. As methods, auto-photography and photo-interviews newly exposed the issues and challenges inherent in qualitative research, especially the need for the research process and the researcher to be open to the unexpected and surprising.*

KEY WORDS

Primary children, Auto-photography, Photo-interviews, Science, Technology

INTRODUCTION

The research was designed to provide insight into the stereotypes and perceptions that children have of scientists and technologists at a time when the number of students studying science and technology is of concern. We set out to investigate how children conceptualized science and technology across the school-home/community boundary. Given we live in a visual culture and visual representations pervade children's lives we decided to explore the use of image-based research (Prosser, 1998; Settlege, 2000). Since the work of Chambers (1983), children's views of science and scientists have been elicited using the 'Draw-a-scientist-test'. Typically, children depict scientists stereotypically as white males, who wear laboratory coats and glasses and work alone with chemicals that can be dangerous (Barman, 1997; Driver, Leach, Millar & Scott, 1996; Manabu, 2002; Rubin & Cohen, 2003). Children's views of technology have also been elicited through drawing (Moore, 1987). For example, Rennie and Jarvis (1995) found that 7-11 year-old children tend to depict technology as products (e.g., computers, electrical appliances and vehicles). Recently there has been a call for new tools to

extend our understanding of children's perspectives (Clark & Moss, 2001; Fler & Robbins, 2003), including multi-method approaches that incorporate the visual. Auto-photography and photo-interviews provide a distinctive qualitative voice, with the method working from pictures to words and not vice versa. In this paper we outline our experiences of using auto-photography and photo-interviews to elicit children's ideas about science and technology.

A sociocultural perspective on learning informed our study. This perspective has become increasingly important in science and technology education research, as researchers have sought to explain and enhance children's learning in a range of contexts, including the classroom. A sociocultural perspective endorses the view that knowledge is socially constructed and acknowledges that activity is always nested in a wider social, cultural, political and economic context (Wertsch, 1991). From this point of view, children are members of multiple communities who learn different ways of participating in the world and this shapes their sense of who they are, where they belong and who they want to become. In classrooms children extend their knowledge and skills, and at the same time they form perceptions of what it is to know and learn a subject and these impressions shape their future engagement with the subject as an area of interest and study (Boaler & Greeno, 2000). Children's out of school experiences also shape their understandings about who can be, for example, a scientist/technologist and the contribution each makes to society, or not.

A RESEARCH APPROACH

In this study, we were prompted by Sara Delamont's address to the NZARE/AARE conference in 2003 to consider what, if any, 'Lebanon Gate' research we were involved in. As described by Delamont, Lebanon Gate research involves a deliberate journey into the unknown; a journey that might challenge "our epistemological certainties, our standpoints, our methodological foundations, and we could be forced to find new literatures, new theories, new perspectives on education itself" (Delamont, 2003, p. 4). We had both explored children's ideas through a combination of classroom observation and interview. During a discussion on how we might learn more about children's understandings we stumbled upon the idea of children taking photographs. A review of the literature revealed that auto-photography had the potential to allow us to explore children's ideas in a way that would challenge our perceptions of how children might see science and technology, and how they could participate in the research process.

Auto-photography as a Tool for Generating Data

Photographs have value in society. Children have seen family members take, pore over and talk about photographs. Photography and photographs are emerging as a means for studying social phenomena. Photographs can portray, describe and analyse (Harper, 1997; Rubin & Cohen, 2003). They can provide children with an alternative that may complement verbal and written language (Burnett & Myers, 2002; Clark & Moss, 2001; Dodman, 2003). Taking photographs as Sontag (1977) points out, "is an event in itself, and one with ever more peremptory rights" (p. 11).

In auto-photography participants take photographs themselves. All of the children (38) in a rural two-teacher year 1- 8 school participated in our research with the informed consent of their families. The principal and teacher were enthusiastic about being involved in the project. The school culture was one that encouraged children to relate to adults in the confidence that adults would be interested in them and their ideas. Each child was given a fifteen-exposure, single-use camera for the purpose of taking photographs of science and technology. These particular cameras were selected because they were relatively straightforward to operate, were light, compact and produced high quality photographs. Their disposability meant there was no need for concern from either the children or their families about damaging expensive equipment. Digital cameras were not used because the children would need to take turns. And, we did not want them discarding images because of technical imperfections, persuasion by others, or a change of mind. We gave the children brief instructions about how to use the camera. Each child took a sample photograph practising how to frame an object and take a photograph (Photograph 1). While this practice exercise may well have altered the images selected and captured by the children, the intention of this study was not to refine photography skills, but rather to explore the children's perceptions of science and technology. The practice photographs were developed and returned promptly to give children feedback.



1. Practising with the camera

The children were also 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 14 of 'science' and 'technology'. We appreciated that the children might not have distinguished science and technology as separate entities. Indeed, this research was to try and find out if and how they had made a separation. When we gave our verbal instructions to the children we were careful not to engage in explanation of what might be science and technology. We encouraged the children to take photographs at home, at school and in the community. They were given 10 days to take the photographs. All 38 cameras were returned and we had the photographs developed. 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 (Photograph 2).



2. Oscar's self-portrait

The children were very pleased with their self-portraits and often identified them 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.

I'm sorry but John went to a friend's house the day he got the camera and took random photos, so we have no idea what photos have been taken.

Nonetheless there was evidence that the children had taken the task seriously. For example, they had searched out specific items and instances to photograph. Some children even staged photographs, for example photographs 3 and 4.



3. Ross's balloon



4. Lenny's tools

Family members had obviously been involved in the children's taking of photographs at home. One mother told us that her child had asked her the meaning of science and technology. She had responded by reading out dictionary definitions. She had contacted us because she had been impressed that her child was able to immediately choose subjects to photograph. Natalie (a year 6 child) 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 (Photograph 5).



5. Kerry's cupboard doors

Other children had sought help to set up photographs, for example photographs 6 and 7. As Sarah (year 2) said, *My dad helped me get things out and got me set up.*



6. Liam's dog and Mum's shadow



7. Lydia's chemical reaction and Mum's hand

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.

Auto-photography allowed us to research 'with' children rather than conduct research 'on' children. We were mindful of Graue and Walsh's (1995) assertion that the key to good practice in researching with young people is relying on them "to teach the interviewer the questions most important to ask" (p. 146). In our study the children took the photographs without our direct involvement; they were in control of the camera although sometimes others influenced their use of it. The obvious involvement of others in the data generation process led us to consider the extent to which any data are out there to be collected (Smagorinsky, 1995). 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 & Moss, 2001). The children using a camera for research also attracted the attention and interest of friends, parents and relatives. This was an unexpected but perhaps not unsurprising outcome. For us, it has raised new research questions to do with how

children taking photographs about science and technology could be used as a means to engage the wider school community in conversations about science and technology.

When we conducted a content survey of the photographs we found that many of the photographs were of farm animals and machinery, plants, household appliances and the school environment. This highlighted the role context plays in the generation of data; the children could only photograph what they had access to. At another time the children might have interacted with different people and had access to different situations and artifacts. Children from a city school would not have such easy access to cows, tractors and a country school bus.

Teasing out Meanings: The Photo Interview

Photographs as images are both socially and technically constructed (Fasoli, 2003; Walker, 1993). Taking a photograph involves the selection of data and the exclusion of other data. In our case some 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 8). 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. James was also surprised when he first saw his photograph of a video (Photograph 9). 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.*



8. Tamsen's sister and the toaster



9. James' video

Sontag (1977) reminds us that photographs are an evaluation of the world. For this reason it is important for research purposes to find out what were the intentions of the photographer. In our study each child was involved in a photo-interview (Walker, 1993) in 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. This photo-interview time was the first time they saw the photographs they had taken. The children were excited to see their photographs. We asked them to first select and talk about their 'favourite' photograph as a way of opening up the conversation. Next we asked them to sort

the photographs into science and technology and to talk to us about their reasoning. Finally we asked them to select two photographs for a community exhibition.

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 photographs 10 and 11.



10. John's cousin



11. Jenny May's family

The photo-interviews highlighted that the children had not always composed the photograph in a way that made it obvious what it was they intended to picture. This confirmed for us that it is important to talk to the photographer about their intentions when seeking to make sense of a photograph. For example, photograph 12 and 13 were intended to picture a light and a cell phone.



12. Sue's light



13. Natalie's cell phone

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.

When the children selected the two photographs for a community exhibition, they dictated sentences to be displayed with the photographs to explain what the photographs showed and how each photograph exemplified science, technology, or science and technology. This required the children to make an evaluative judgment about their photographs. Composing the sentences directed their attention to the science and technology. Some children struggled to form a sentence around the science and technology ideas. For example, one child chose the photograph of her mother because 'she was beautiful'. Other children made sure we wrote down only and exactly what they dictated.

ANALYSIS OF THE PHOTOGRAPHS

Photographs are open to multiple readings (Prosser, 1998); their analysis is not a simple matter. In our study, we were interested in children's ideas about science and technology and so we asked them to sort their photographs into sets that showed 'science' or 'technology' to gain an insight into their ideas (Walker, 1993). We found the sorting and explaining activity a useful way of focusing our discussion with the children because they could talk about their science and technology 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.

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. An example, photograph 14 is of Craig's (year 6) classification of his photographs into science (on the left) and technology (on the right). Craig's reason for particular photographs being science was that the image was of something that was growing or living. His technology reason was that the image was of machinery or an item that required electricity.



14. Craig's classification

Fourteen children confidently categorized their photographs and gave clear reasons for the categories. Eight of the 11 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, the children 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 science/technology divide was not useful for eight of the 13 ten-to-thirteen year-old children. As they were sorting their photographs and explaining their reasoning they developed a combined 'science and technology' category.

Only six children explained that people made technology. 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)

Using the children's ideas that technology usually involved electricity, we initially sorted their technology photographs into electrical/powered and non-electrical sets. All but one of the children, who took only science photographs, had photographs in the electrical category. Only ten children had photographs in the non-electrical category (e.g., furniture, glasses, mangle, oil lamp – photograph 15). We further divided the electrical/powered category into sets depending on the place and/or function of the technology. All of the children, except the one who only took science photographs, included at least one photograph in each of these technology categories: communication technologies (e.g., TVs, stereos, video players, DVDs, cell phones, fax machines – photograph 16), 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 17) and vehicles (e.g., cars, motorbikes, bicycles) and toys that used batteries (photograph 18). Some technology photographic examples follow.



15. Non-electrical goods
(Kirsty's chair)



16. Communication technologies
(Jen's computer)



17. Farm machinery (Liam's tractor)



18. Toys (Adam's Buzz Lightyear)

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)

All the children, except three who only took technology photographs, had taken at least one photograph of 'science as living things'. These living things included plants, (e.g., trees, grass, flowering shrubs, pot plants); animals (e.g., farm animals and pets – photograph 19); and people (e.g., family members, body parts – photograph 20).

The children also talked about weather, food, science-in-action, and reactions as science. We used these categories. Nine children talked about the weather as being science (photograph 21); 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* (photograph 22). 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*. Some science photographic examples follow.



19. Jamie's cat



20. Alan's muscles



21. Liam's sun



22. Karen's sister jumping

Although there was a tendency for the older children to group confidently and provide a coherent explanation for their grouping, there was little difference between all of the children in what they had depicted in their photographs.

THE EXHIBITION

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). In our study we decided to hold an exhibition of photographs in the local community hall so that children with their families could come together to acknowledge what the children had achieved and by way of a thank you to the school and community for their support of our research. Each child had two self-selected photographs displayed. The commentary about the photographs 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 23 shows the hall ready for the exhibition). The static display was complemented by a data show of the photographs. The data show was the first opportunity they had to see each other's photographs. During the data show excited whispers filled the air (Photograph 24).



23. The exhibition in the hall



24. 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 (photographs 25 and 26). An evening viewing was held to provide an opportunity for the community to view the photographs. Ten of the 28 families attended.



25. Reading captions



26. Viewing with friends

Teachers and parents were surprised at the diversity in, and the quality of, the children's photographs. They were impressed that the children were able to distinguish between science and technology. Teachers and parents were unanimous in the benefits of children using a camera and photographs to explore and explain their ideas of science and technology 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 science and technology were he confidently took photographs. 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 science and technology between children and their families and parents appreciated the opportunity to talk with their children in this way.

CONTINUING AVENUES AND ISSUES

The goals advocated for science and technology education encompass outcomes that include the skills, knowledge and attitudes that will lead children to

become life long learners who are active and informed participants in a democratic society. There has been an increased interest in public understanding of science/technology and an appreciation that people obtain much of their knowledge of contemporary science and technology from the media (Hodson, 2003; Rennie & Stockmayer, 2003). It is now recognised that all people need to make judgements about matters underpinned by science or technology but overlaid with wider considerations (Goodrum, Hackling & Rennie, 2001; Hipkins et. al., 2002; Hodson, 2003; Millar & Osborne, 1998). Auto-photography and photo-interviews bypassed the need to rely solely on children's technical and artistic skills they would require if asked to draw a scientist/technologist and the communication skills and understandings required to respond to a direct question what is science/technology.

Auto-photography and the photo-interview were accessible techniques for helping children explore and depict their thinking about science and technology, one that allowed and demanded they make connections to their world. 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 had the camera for themselves and that they took more than one photograph. Taking 15 photographs meant the children were able to provide multiple responses. Taking and then examining their photographs were both important parts of the research process for the children and for us. The photo-interview was important to give the children an opportunity to talk about their intentions and their thinking about what was depicted in their photographs. Talking about their photographs, then sorting and talking about the sets as representing science and technology prompted the children to reflect on their ideas. It allowed us to probe the children's understandings. During the photo-interviews the children were able to experience adults listening and responding to them about what they thought and saw.

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 science and technology have a role in children's lives both in and outside school. Their photographs suggested that the children had some appreciation of this, though there were no photographs of people actively engaged in doing science or technology. In retrospect this was not surprising given our instructions. In our next iteration of this research we plan to prompt children to include photographs of themselves and/or others doing science and technology.

The level of school and family interest and involvement generated by this project has been a surprising outcome. A project such as this could provide a forum for genuine school-home collaboration that has the potential to lift children's academic achievement (Biddulph et.al., 2003). It could also provide a vehicle for teachers to find out about the learning experiences children have at home and in the wider community (Cumming, 2003).

This project had been a learning experience for us. It was exciting to be venturing into the unknown (Delamont, 2003). We were not sure how young children would respond to the task. Photography is able to actively engage children in the research process in a way that turns a lot of the power over to them.

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