Paper Title Postcards of the Landscape: Researching Children's Perceptions of the Environment Through the Arts

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Session Title Cultural and Environmental Issues Utilizing the Arts

Session Type Roundtable Presentation

Presentation Date 4/10/2011

Presentation Location New Orleans, Louisiana, USA

Descriptors Arts Education, Early Childhood, Environmental Education

Methodology Mixed Method

Unit SIG-Arts-Based Educational Research

POSTCARDS OF THE LANDSCAPE:

RESEARCHING CHILDREN'S PERCEPTIONS OF THE ENVIRONMENT THROUGH THE ARTS

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ABSTRACT:

Australia holds some of the most unique, diverse and vulnerable ecosystems in the world, ranging from marine, coral reefs, to the arid and semi-arid outback, to tropical rainforests. Young children's perceptions of, and attitudes to their environment carry with them into adulthood, determining their capacity to learn about and interact with their world. To sustain Australia's unique landscapes it is essential that these future adults have an informed knowledge of the role, value and function of the country's environment. To ensure that we are helping the youth of today understand the natural environment we must first determine their current perceptions of it.

This research describes an Arts/Science nexus; while traditional data collection methods, such as surveys, interviews and focus groups are often used to determine children's understandings, these methods are limited by their reliance on words. Children, particularly young children, do not always have the words to describe what they see, think or feel. The Arts, however, can be used as tools to help children express their ideas and feelings. So our research question was: how can we use an Arts-based methodology to determine children's perceptions of their environment?

To answer this question, five arts-based strategies were trialled, tested and refined. This article elucidates these different strategies, including the methods used and the impact of these methods on children's expression of their environmental understandings. It concludes with a description of the researchers' key learnings relating to arts-based data collection methods to determine children's environmental perceptions.

Key Words: Arts-based Data Collection; Early Childhood Environmental Understanding; Environmental Sustainability

INTRODUCTION

Australia holds some of the most diverse and vulnerable ecosystems in the world, ranging from the marine, coral reefs, to the arid and semi-arid outback, to tropical rainforests (Westoby, 1993). These ecosystems are composed of unique biodiversity that has evolved on this continent for millennia and provides ecosystem services (e.g. clean air, clean water, primary production) that sustain Australians today (Millennium Ecosystem Assessment, 2005).

To maintain Australia's ecosystems and the services they provide, it is essential that the children of Australia have an understanding about the role, value and function of the country's environment. The attitudes and perceptions they carry with them into adulthood determine the ways in which these adults of tomorrow will interact with their world (Ewert, Place and Sibthorp. 2005). Attitudes and perceptions are formed through children's interactions with the world, their education and the society and environment in which they live (Olli, Grendstad and Wollebaek, 2001; Steadman 2002; Villacorta, Koestner and Lekes, 2003). To ensure that we are helping the youth of today to understand and protect the natural environment we must first determine their current perceptions of it.

Sorin (2004) explains that children, particularly young children, do not always have the words to describe what they see, think or feel. The Arts, including visual art, drama, dance, music and media, can be used as tools to help children express their ideas and feelings. As Cornett (2007) notes, “The arts are viewed as indispensable sources of cultural and historical information, givers of diverse perspectives and values and remarkable tools to make meaning” (p.2). Unfortunately the arts are often overlooked and/ or undermined “perhaps from misdirected assumptions on a practical level surrounding content and delivery… [but also because] the Western bias towards linguistic intelligence means that skills which utilised embodied practice and body intelligences tend to be denigrated” (Cook, 1999; Wright,2003, cited in Knight, 2008, p.307) This is not to say that, in the Australian context, all areas of arts education (dance, drama, media, music and visual arts) have not been researched. For example, extensive collections of children’s drawings have been gathered by researchers (Ibid, p.314).

It is widely recognised that the content of children’s drawings may provide insight into their feelings and thoughts about the world (Barazza, 1999) and the power of visual narratives for exploring ‘big ideas’ have been potent throughout history. Anning & Ring (2004) note that children’s creativity is syncretistic, meaning the individual arts have yet to be separated and specialised, therefore children are likely to draw pictures and tell a story at the same time. They suggest that young children’s narratives offer tools for them to organise and explain

their complex worlds. However, as Rose (2007) highlights, despite the huge amount of academic work being published on the visual, there remain remarkably few guides to possible methods of interpreting visual materials, and even fewer explanations of how to implement these methods. With this in mind, our research question was: How can we use an Arts-based methodology to determine children's perceptions of their environment?

The aim of this research was to develop and refine methods of ascertaining young children's perceptions of the environment in which they live. Five arts-based strategies were trialled and evaluated to determine the best methods for eliciting children's perceptions of the environment. Within the five strategies, approaches included: presenting children's picture books; using props; drawings; storytelling; dramatising and introducing an authentic task.

This article describes the five different arts-based strategies, including the methods used and the impact of these methods on children's expressions of their environmental understandings. It concludes with a description of the key learnings researchers uncovered, relating to effective and ineffective data collection methods used when implementing an arts-based methodology to determine children's environmental perceptions.

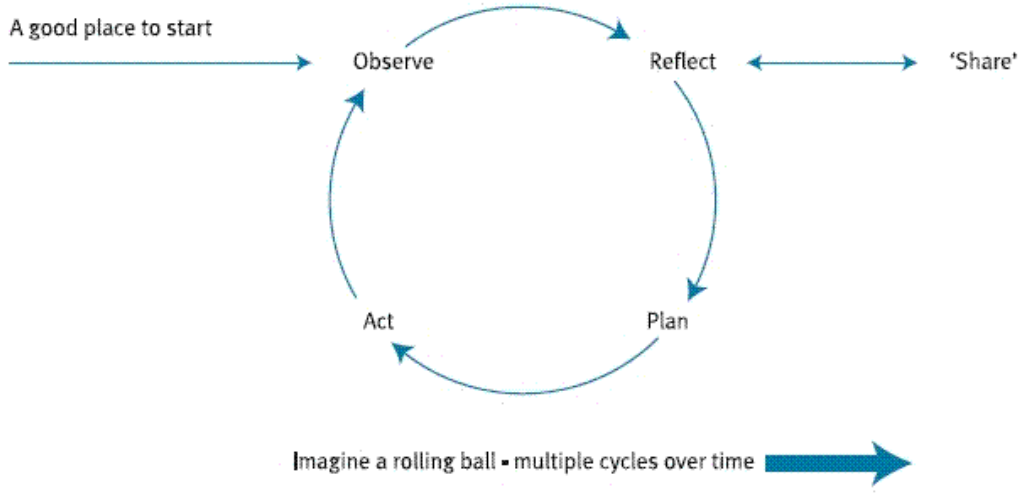
OVERVIEW OF THE RESEARCH METHODOLOGY

The research question of this study was formulated collaboratively by combining the interests and backgrounds of two very different professionals: Professor Iain Gordon, a CSIRO scientist, interested in children's environmental understandings; and Dr Reesa Sorin, a James Cook University early childhood/ arts lecturer. We established a partnership, focused on ascertaining what young children understand about their environment and the best ways in which to elicit these understandings from them. Resulting from this joint effort, the following research question, "How can we use an Arts-based methodology to determine children's perceptions of their environment?" evolved.

Our journey to generate data responsive to the research question took us to a number of different classrooms, year levels and locations. Over one hundred children, aged from 5 – 12 in urban, rural and remote schools were involved. These schools included state and private schools in north Queensland and an international school in the Philippines. Five arts-based strategies for collecting data about children's perceptions of the environment were developed, trialled and refined. Data collected included children's drawings, their verbal accounts of the drawings, and teacher and researcher notes.

To develop, trial and refine various arts-based data collection methods researchers implemented an Action Research approach. This involves researching a practical issue

using a cyclical process, with the implications of this approach being that the research process is ongoing and changes to methods occur to improve results, thus improving its applicability to real-world situations. (Denscombe, 2007). The steps involved in the cycle are found in the diagram below. Each of the five arts-based strategies were implemented and evaluated, by the researchers, classroom teachers and principals based on their strengths and aspects in need of change. A discussion of the action research process of this study is presented in the next section. Here is a model of the Action Research Cycle:



http://www.fahcsia.gov.au/sa/housing/pubs/homelessyouth/on_par/Documents/Participatory_Action_Research/sec1.htm

In addition to the reflection of the action research cycle, data, in the form of children's drawings and stories, were analysed based on two factors - the content of their drawings (using quantitative content analysis); and the general mood and feelings attributed to their environmental depictions (using qualitative coding). Findings generated from the data analysis highlighted the strengths and weaknesses of particular arts-based methodologies, adding to the evaluative and reflective action research cycle. A discussion of the five arts-based strategies and how they were developed and refined using the action research approach is now provided.

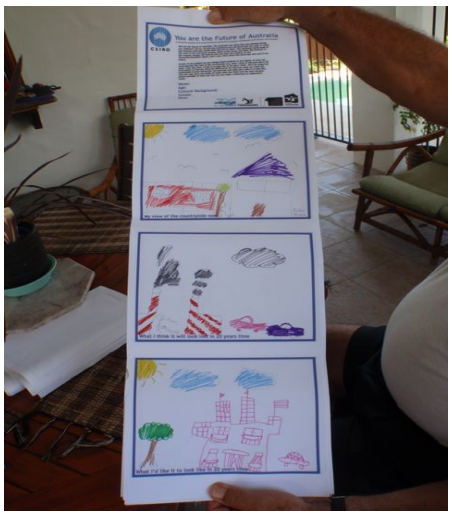
Strategy 1: Drawing/ Counting

Few people acknowledge that "drawings can be used to demonstrate unimaginable conceptual understandings in ways that cannot be expressed through language" (Kress, 2000, cited in Kendrick and McKay, 2004, p.124), or indeed that drawings are a symbolic form of language, despite its large research focus. Those who have used drawing as a data collection tool have widely recognized "that the content of children's drawings may provide

insight into their thoughts and feelings about the world" (Crook, 1985, cited in Barazza, 1999, p.49).

The first phase of this research used a Drawing/Counting strategy for data collection and analysis. This initial phase of the research was conducted by one of the researchers independently, as it was before the research partnership was established. Primary school-aged children in north Australia and in an international school in the Philippines were asked to draw the environment as it is today; as they think it will look in 20 years; and as they would like it to look in 20 years. The decision to focus on primary school-aged children was based on an awareness of the importance of attitude formation in the early years of life. White (2004) noted that "Many authorities believe the window of opportunity for the formation of bonding with and positive attitudes towards the natural environment develops sometime during early and middle childhood and requires regular interaction with nearby nature" (p.3). Further, research conducted by Chawla (2007) into what fostered the desire to care for and nurture the environment in environmental activists and educators demonstrated "from half to more than 80 percent of the respondents identify childhood experiences of nature as a significant influence" (p.145).Each child was given a long sheet of paper with instructions at the top, and three A4 -sized rectangles (Figure 1 below). Drawing materials were standarised so that each student was given an identical set of coloured pencils. The children were given 20 minutes to complete their drawings.

Figure 1



At the end of the allotted time, drawings were submitted to the researcher. Quantitative content analysis was conducted, with information such as the number of houses, trees, cows and plants counted in each of the three rectangles. For the most part, human-made objects dominated the drawings in response to the question of what the world would look like in 20

years from now whereas natural objects such as plants and animals were more prolific in drawings of how children would like their future environment to look in 20 years.

The Drawing/Counting strategy standardised the way in which information was collected from children and ensured that there was not inherent bias in the way material was gathered. While detailed content information was evidenced through this strategy, there was no supporting information about what children were trying to represent or feeling about their drawings and the environment. Drawings by younger children (aged 7 – 9) were often difficult to understand. While children were drawing, the researcher did not interact with them or take notes about what they were saying. The three A4 size rectangles may have restricted what could be added to the drawings. Therefore in the next strategy we decided to increase the paper size. Finally, it was noted from the detail in many drawings that many of the older children seemed to have been taught a fair amount about environmental sustainability, either directly through their schooling or indirectly through the media. This was evidenced in those drawings that included a present-day depiction of pristine, untouched environments and a future depiction of overly-developed ones. Based on the above issues and the researcher's inexperience with analysing children's art, the researcher decided to bring an art and childhood expert on board to improve the data collection process and it was with Strategy 2 that the researchers began collaborating.

Strategy 2: Children's Picture Book, Window Frame, Drawing and Voluntary Storytelling

The second strategy was our pilot study as a collaborative team. We shifted the research strategy to a voluntary "drawing telling" approach, where "drawing is used to describe children's use of a range of signs when depicting imaginary worlds on paper" (Wright, 2007, p.37). In particular "drawing telling" involves children in a process whereby they switch between the use of verbal and non-verbal modes of communication in order to best represent the meanings they would like to get across. Cox (2005, p.123, cited in Wright, 2007, p. 38) describes it as follows:

> Talk and drawing interact with each other as parallel and mutually transformative processes. Sometimes the talk feeds into the drawing with the verbalised intention being transformed into drawing. Sometimes the drawing feeds into the talk; the drawing intention is transformed into talk. Sometimes these processes are apparently concurrent.

Children were asked to construct a drawing of their present-day landscape and a drawing of what they imagined their landscape would look like in 20 years time. If they chose to do so,

they could tell or write a story about their work. By using the “drawing telling” approach we felt we would be better able to understand children’s current perceptions of the environment and their predictions for the future.

A key concern we had with Strategy 1 was that children’s environmental understandings were difficult to understand from their drawings alone. We decided to add storytelling, on a voluntary basis, to the process. Data were collected from 6 and 7 year olds in a Year 2 class.

Time was extended from the previous 20-minutes per drawing to a half-hour introduction and at least one hour of class time to complete two drawings; one of the environment as it is now and the other of the environment as they envisage it in 20 years. The extension of time to complete the drawing activity was in response to a number of children having incomplete drawings in the first phase of the study. Paper used was larger than the previous A4 size; we used A3 sized paper to allow for more flexibility than in Strategy 1, where the A4 size seemed to restrict what could be drawn. Drawing materials consisted of drawing pencils, coloured pencils, crayons and felt-tipped pens. Each table of children was given a container of these materials to share amongst themselves.

The researchers introduced the data collection session by reading and discussing the wordless picture book, *Window* by Jeannie Baker. *Window* tells the story of a boy growing up in an increasingly industrialised landscape. Butler (2008) describes the story as follows:

> In the first panel a woman stands at the window, holding a baby, looking out at bush teeming with bird life and plants, with wooded hills beyond. The double-page spreads follow the view from the window as the baby grows up. And as he grows, the landscape seen through his window changes, reflecting the impact of the expanding community.
>
> The trees and birds gradually disappear, to be replaced by houses, roads and supermarkets. The last panel, showing the grown-up baby holding his newborn child as he looks through a different window at a pristine piece of bush set aside for a housing estate, brings the 'story' back to the beginning.

Using the concept of the window frame, as exemplified in the story, the researchers followed up the book discussion by giving each child a cardboard square (window frame). Children were asked to imagine and then draw what they could see in their environment from their

window frame. Children used the materials provided, but also brought out rulers from their desks to draw window frames in their pictures.

As they completed their drawings, the researchers and classroom teacher circulated and wrote down children's comments in a notebook or on children's work if they requested. Note-taking was a process used by the researchers consistently in the remainder of the strategies. Children who finished their drawings while the researchers were present in the class showed their work to their classmates and described what was in the drawing. Those who had not finished were allowed to complete their drawings at a later time. Drawings were collected from the teacher in the following week, but with no clear indication of the time taken to produce them. The teacher used the cardboard window frames in further arts and science lessons, as a way of getting children to look carefully at objects in their environment.

Content of the drawings was examined quantitatively for the presence or absence of natural and human-made objects, and qualitatively for the elements of design and mood they conveyed. Many drawings included the window frame and children drew literally what they saw when they held the frame in front of their faces, including views of the classroom and school grounds. The natural landscape in which they lived was present in only a few drawings. Instead, there were scenes from the classroom, such as the desks, chairs and books, and some indication of a tree or two outside the classroom window. From this experience, it was felt that the cardboard window frame had too great an influence on the drawings and that there had to be a better way of encouraging children to represent what they see in the environment in which they live.

With no real time restriction, drawings that were completed over a longer period of time showed more detail than those completed with the researchers in class. Children who took extended time to finish their drawings could have discussed their drawings with others outside of the classroom and this may have influenced their final creations.

We reflected that the age group (early primary) was suitable for this research as, from their discussions, it seemed that many had not yet learned much about environmental sustainability. For example, a number of children thought it was better in the story when the trees were cut down and more buildings appeared in the landscape.

We decided against using the cardboard windows, as many children spent time ruling lines on their paper to produce a window frame, rather than focusing on the content of the environment. They also strayed somewhat from the task, using their windows to view what was around them. However, we maintained the idea of using the book, *Window,* as an introduction, A3 sized drawing paper, and the same variety of drawing materials.

Strategy 3: Children's Picture Book, Drawing and Voluntary Storytelling

Strategy 3 of this study was similar to Strategy 2, but with minor changes. We still used the book, *Window,* and the same drawings materials, but omitted the cardboard window frame as a way to encourage children to be more imaginative. Children involved were once again from lower primary classes (5 to 8 year olds) in one rural state school and one urban private school.

After an introduction of approximately ½ hour, introducing the *Window* book, children were given up to 45 minutes to complete two drawings: one representing children's current environment and the other how children thought their environment would look in 20 years. When they had finished their drawings, they had the option of telling a story about them, writing a story,and/or sharing it with classmates.As it is recognised that not all children have or wish to tell a story about their work, they could simply hand their drawings in to the researchers. When the time was up, children submitted their drawings to the researchers. In the previous phase, Strategy 2, it was identified that those children who had extra time to complete their drawings may have been influenced by outside sources, therefore drawings in this phase were handed in whether completed or not to avoid possible outside influences.

Drawings were matched so that each child's present and future drawings were placed side by side in a folder. They were analysed both quantitatively and qualitatively. Upon first examination of the pictures, we developed categories that encompassed the major classifications of items in the drawings. In all there were 16 categories including trees, people, domestic and wild animals, houses, buildings, vehicles, water, roads, sun, vegetation and windows. One of the researchers then went through all of the drawings individually and completed a quantitative content analysis. Quantitative content analysis is a method used to analyse any sort of text, by means of quantification (Denscombe, 2007). The development of relevant categories takes place prior to quantification and, to complete the process, the presence or absence of particular categories in the drawings were noted. In doing so, we were better able to compare differences in children' perceptions of the present and their outlook for the future.

Qualitative analysis was applied to the drawings based on the elements of design (line, shape and colour) and mood of the picture. The two drawings together were examined for the changes they demonstrated, such as going from many trees to no or one tree, or changing from a "happy" scene to an "unhappy" one. Written stories by some children and comments recorded by the researchers were added to children's work to provide a deeper understanding.

Many drawings of the present environment were filled with organic lines and shapes, bright colours, and flora-filled settings, with animals and usually happy, smiling people. As in previous stages, a number of children portrayed the future environment pessimistically in terms of a lack of natural features. There were fewer trees and plants and less water (all valuable natural resources) in the future drawings and an increase in people and buildings. This may have been due to prior learning or the influence of the book, *Window.* Future drawings presented sharper, geometric lines and shapes, darker colours and the replacement of living with inanimate objects.

Use of space often changed between drawings. The open spaces represented in the first drawing became more crowded in the second drawing. Because of changes in colour, shape, facial expressions, objects in the environment and use of space, mood changes were apparent in many pictures and most pictures reflected the negative changes depicted in the book, *Window.* But not every student portrayed the future as bleak – for a small number of children the future was similar to or even better than the present. We also found that some children's drawings seemed to represent their own interests, such as Thomas the Tank engine, rather than demonstrating their perceptions of the environment.

Some children drew literally what they could see from their windows at home, and in one case this was a tall fence blocking most of the view (Figure 2 below). With storytelling voluntary, some of the drawings not accompanied by stories were difficult to understand.

Figure 2

In our reflections, we noted that the influence of the book, voluntary storytelling, time and material constraints were issues that we needed to consider.

Window is a powerful book. Through beautiful illustrations and without words it tells a story about the destruction of the natural environment. Its message is clear, and while this may have helped to introduce the idea and to focus children's attention on the issue of environmental sustainability, it left little room for other perspectives, such as that building up

residential areas is good, or at least a necessary development. Environmentalists may want children to understand the importance of sustaining natural environments, but as a research technique it seemed to bias children's depictions rather than providing us with a true glimpse of their perceptions.

Each page of the book, *Window,* is presented as a view through a window frame and even without the use of a cardboard window frame some children still attempted to model this idea by drawing or carefully ruling a window frame onto their paper. Rulers were not provided to children for this activity, but as they were in their classrooms they had access to items at their desks.

Stories about children's drawings were optional, because not all drawings have a story, nor do all children wish to tell a story about their drawings. Early drawings are often ways that children explore elements of design, such as colour, line, shape and texture, and experiment with the concept of working within a confined, usually rectangular space. This spatial exploration is often a precursor to writing, where children are required to shape letters in specific ways and to fit within the parameters of the line and page.

Those children who did share a story about their drawings enriched our understandings of their drawings. For example, M. drew a picture of tree-filled, rolling hills and two small houses to the side. Her story was: *In the morning I wake up and go for a walk and go to school. I see trees and houses and flowers. I see hills.* (Figure 3 below).

Her story confirmed for us that it was a genuine experience, rather than something gleaned from the picture book.

The length of time allocated and the concept of time were issues that impacted significantly on the data. Because of time constraints, the use of large A3 paper and the provision of fine tipped drawing materials, children were often unable to complete their drawings. This could have limited or even caused misrepresentation of what they were trying to describe. Time constraints may also have been the reason why some children' first pictures were colourful and their second ones were not. For example, B's first picture utilised dark green, red and brown as he presented rounded hills, a sun, clouds and trees, alongside more angular cars, buildings, a road and a rocket. His second picture was much more angular, with three of the four people looking very angry. The only colour used was red and the picture was largely uncoloured. B's story of the second picture was that it was "red hot and angry", so perhaps the solitary colour was what he intended, or perhaps he was limited by time. Time constraints also precluded us from discussing the drawings in depth with children who were willing to discuss their work.

The concept of time was another issue identified in this stage of the research. Not all children seemed able to conceptualise the future, particularly those in the younger grades. In his drawing of the future, a Preparatory student (4-5 years) drew five small squares on the paper and wrote: "I have no I dey [idea] no". The concepts of time: past and future are abstract, and not all young children seemed to be able to conceptualise the future and what it would look like. We used terms such as "when you are a parent", or when you are 26 (if the student was 6) to try to help them to conceptualise, but some clearly were unable to do so.

We identified some material constraints at this stage of the research. Children were presented with large sheets of paper, which were difficult for many to fill within the time period, particularly without paint and thick paintbrushes. We used a variety of drawing materials, including coloured pencils, textas, crayons and pastels to various age groups, from thick wax crayons to finer coloured pencils. However, children had to share supplies with others at their tables, so usually 4 or 5 children shared one container of drawing materials. At times this seemed to limit the colour and material choices used in the drawings. No rulers were given to children, but as they did their drawings at their desks many used their own rulers and other supplies.

Strategy 4: Drawing, Storytelling and Dramatisation

Reflecting upon Strategy 3, we noted that those drawings that were accompanied by a story gave us a great deal more information than ones without a story, so we decided that storytelling would no longer be optional, but a requirement. We were also concerned about time and materials allotted for drawings, so during this stage we trialled new approaches. The class chosen for this stage of the research was a Preparatory to Year 3 class in a small, remote State school (giving us in total experience in urban, rural and remote contexts). Children were aged from 5 to 9 years.

While we felt that the book, *Window,* or any book, could have too great an influence on the drawings, we wanted to keep exploring the use of the arts as data collection tools. As a way of introducing the topic, we decided to replace the book with a dramatization. As researchers we became tourists from overseas (fortuitously one researcher is from Scotland and the other from Canada), a bit lost in this new environment and wanting to know more about the local area, particularly frogs and other local wildlife. We presented our dilemma to the class, who easily engaged in discussion with us.

Children in the class gave us quite a lot of information, and agreed to do drawings and to dictate or write a story about their drawings. They were given A3 paper and the same drawing materials as in Strategy 3, but a number of the children in this class, who began with these materials, made further drawings on classroom paper with other available classroom materials, such as paint and various-sized paper. All children shared their work with the researchers or teacher and the class. With children's instructions about where to locate frogs and other local wildlife, and with their drawings in hand, the researchers left the class to look for wildlife.

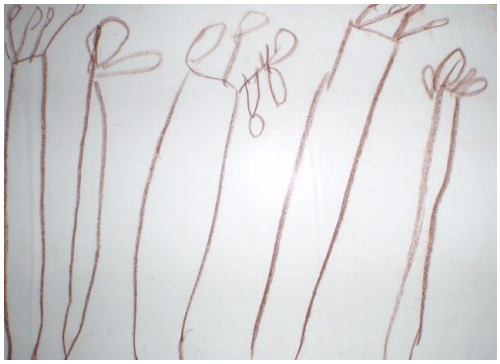
As part of the dramatization, the researchers returned later in the day, having seen wombats and birds, but disappointed that they had not seen any frogs. The children were eager to help, so took the researchers outdoors to the creek behind the school and to the school toilets, where frogs could be seen in the drain pipes. Some children drew further pictures for the researchers, including drawings of frogs in the school's drains. These pictures were by choice created entirely with classroom materials, mainly A4 paper, paint and pencils.

Drawings from this session were examined using analysis techniques described previously. From our reflections, including extensive reflection with the classroom teacher, it was clear that the stories and dramatization supported our collection of rich data.

Requiring children to share stories about their drawings made a great difference to our ability to understand the drawings. For example, one student did a drawing of several trees, with two hanging objects (Figure 4 below). Her story was: *"These are the bats hanging in the*

trees. When we went there we had some lunch and we saw some bush turkeys. When we left they hopped on the tables and ate all of the scraps that we left behind." Without the student's story we would have missed much of the rich detail that she had thought about when completing the picture. Stories, then, appear to be indispensable to understanding the meanings associated with children's drawings.

Figure 4



The teacher told us that this class had previously studied some environmental topics such as bush animals. They had also used the arts to express their understandings of subject content. This may have influenced the drawings and stories they produced for this research.

Dramatisation was considered a more successful strategy than introducing the data collection process with a story and discussion. By the researchers presenting themselves as strangers with a genuine interest in their local environment, we created an authentic situation that required a thoughtful response. The down side was that future contact with the children would require the researchers to stay in their roles to maintain credibility.

Children's preference for classroom art supplies, such as paint and smaller paper, was another issue for us to consider. Using paint and thick brushes, they were able to easily complete drawings on A3 paper. But with our original drawing materials, many of the larger drawings appeared incomplete, or focused on a small section of paper only. When they were able to choose papers, they generally chose smaller paper to use with our drawing materials.

Strategy 5: Drawing; Storytelling; Dramatisation and Introducing an Authentic Task

When we left the remote school in our dramatized roles, we promised to stay in contact, even when we were "far away" in Scotland and Canada. To do so, one of the researchers wrote a postcard and had it sent to the children from Scotland. In it he described the Scottish

landscape and lifestyle as well as thanking the children for their help and advice when he was a tourist in their local environment in Australia. The teacher reported that the children were very pleased to receive his postcard, and had responded to him with postcards they created themselves. Within the limited space of the postcard, they had produced colourful, detailed pictures and considered verbal descriptions. Our collaborative reflection on this event included examining the use of postcard-sized paper to encourage detailed drawings and written information in a limited time period, and the possibility of introducing an authentic task as a way of engaging children in the research.

Keeping in role, one of the researchers returned to the class, explaining that she had liked Australia so much that she had travelled here again from Canada. The conversation moved to the postcard the class had received from Scotland and the postcards they had sent to the Scottish researcher.

The researcher suggested that children in Canada (in particular her nephew) might also be interested in learning about their local environment. The class decided to make postcards for her nephew. Paper was cut to the size of a large postcard and children used the variety of drawing materials available in the classroom. They easily filled the card and were eager to dictate and/or write stories to the Canadian children. For example, one student drew a colourful and detailed picture of trees and buildings (Figure 5 below) and wrote: *“I’m planting 2000 more Honeygold Mangoes. I have lots of trees. We’ve got a Playstation. I live on a farm. There’s lots of tractors on our farm. We’re making bigger sheds.”*

Figure 5

Reflections of this research visit suggested to us that the size of paper should be smaller, with the large postcard-size seeming to elicit detailed drawings and stories. The authentic task, that is, having a target audience with a genuine interest in their drawings and stories, seemed to encourage children to express their thoughts and understandings, thus producing

rich data. With the smaller sized paper, time periods of 20 minutes to ½ hour seemed suitable. Ideally, we felt that it would be beneficial to have a similar-aged class overseas who could receive these postcards and send back postcards of their own. This would provide rich, cross-cultural data and also benefit the child participants.

KEY LEARNINGS

We recognise and support the value of drawings, alongside other art forms, as data collection tools. As Russell-Bowie (2006, p.3) states "*the arts can embody and communicate emotions, ideas, beliefs and values, they can convey meaning through aesthetic forms and symbols and evoke emotive responses to life with or without words".* A key issue withholding the advancement of the Arts as data collection tool sis the assumption that anything people think, feel or sense can be said or written in language (Kress, 2000). This assumption is misguided and has led to visual forms of representation being under-valued, under-researched and under-represented (Anning, 2003). Additionally, the absence of guides instructing researchers how to conduct visual methods, as mentioned above, has delayed progress in the field.

The purpose of this study was to test how an Arts-based methodology could be used to determine children's perceptions of their environment. We had to overcome the barrier of not having a guide to instruct us on how to do so. Therefore, not only does our study seek to exemplify how valuable the Arts (drawing and story-telling) are as data collection tools, but to provides a "trial and error" recount of what we found effective and ineffective when implementing visual methods. Our key learnings could be categorised under the headings of: Drawing and Support Materials, Storytelling, Time, Prior Knowledge and Children's Interests. Each of these issues are summarised below.

Drawing and Support Materials

While the original use of three A4 size rectangles for the drawings seemed restrictive and early childhood educators usually give children large sheets of paper to create paintings, the A3 size paper used with drawing materials other than paint and thick paintbrushes proved difficult for children to fill. We would certainly consider A3-sized paper if paint were included as a drawing material for data collection along with coloured pencils, crayons and felt-tipped markers. We have had the greatest success with large postcard-sized paper which can

easily be used with pencils, crayons and markers. In the future we will provide enough materials for each child to have a complete selection of colours and types of materials.

The use of the *Windows* book and the cardboard windows seems to influencedchildren' drawings, with many children including a window frame in their picture and repeating issues from the book. A more helpful support seemed to be the audience who would receive the drawings, and in so doing learn about the children' natural environment. The value an audience had for the students can be tied to Newman, Marks and Gamoran's (1995) concept of authentic pedagogy, which refers to tasks that call upon children to construct knowledge, through inquiry, addressing problems that have meaning beyond the school setting. This could lead to international data collection and comparison, as mentioned above.

Storytelling

Until children were required to tell stories to support their drawings, it was difficult to determine all of what was included in drawings and the thoughts behind the drawings. We found that stories about the drawings often provided information well beyond the drawing itself. In future data collection we will request that stories accompany all art works.

Time

Time allocated to drawings varied from 20 minutes to well over an hour per drawing. With the use of A3 or even A4 paper, extended periods of drawing still did not ensure that the picture was completed. In the future as we use the large postcard format and the drawing materials stated above, we will allow children up to ½ hour per art work; in some cases with the option of extending the time.

Not all children understood the concept of "the future" or "in 20 years". With further data collection, we will try to explain the concept of the future in terms that children understand, and accept that not every child will be able to conceptualise the future.

Prior Knowledge

Some children demonstrated an understanding and/or interest in environmental sustainability issues based on prior teaching or knowledge. Future data collection will include asking classroom teachers what they have taught their children about environmental sustainability prior to data collection. In addition it would be useful to question the children themselves as to whether they have learned anything about environmental sustainability from sources within or outside the school, and if so, who or what the source was. In the situation that children do bring to the study prior knowledge, it will not be seen as a limitation

or weakness, but rather as evidence that children do not go to school as empty vessels; they bring to the classroom setting previous learning and experience and this should be acknowledged.

Children's Literal Expressions and Interests

A number of children's interests were presented in all locations throughout the stages of our data collection. The first was that when asked to draw what they saw from their windows, many children drew literally what they saw, including a large fence (Figure 2), a drinking fountain, etc.

Children also depicted images of interest e.g. Thomas the Tank Engine. Anning & Ring (2004) state that children's sense of aesthetics are partly culturally acquired by immersion in popular culture. They develop strong personal preferences for what they want to draw and how they want to draw it. Children's representations of their interests rather than their environments, as the task instructed, provide justification for Anning & Ring's (2004) findings of children's strong personal preferences. In the future, we would consider asking children to share a story about their interest to determine if this interest in some way informs their perceptions of the environment, or whether they are just off task. In the situation they are off task, instructions will be reworded considering this point.

CONCLUSION

The five strategies of our action research have taken us through a number of classrooms and age groups. It has been a wonderful opportunity to reflect and learn. Children in this research demonstrated their ability to utilise the arts to communicate their perceptions of the natural world, and we would certainly advocate using the arts as data collection tools, to glean children's understandings of the environment, or to collect information in other curriculum areas such as mathematics, social studies, and communication. But we recommend that art expression be accompanied by dramatisation and storytelling to elicit rich data. We have explored and reflected on the use of drawing and support materials, storytelling, time, prior knowledge and literal expressions and interests.

Our research journey suggests that there is a value in the juxtaposition of the arts and science in exploring understanding (and in the future, teaching children) about environmental sustainability. We look forward to future data collection, using the strategies we have developed through the cycles of this action research.

Movement towards a sustainable society can only be achieved through education. Transformation of the educational system could involve increasing the value of the Arts

(including storytelling), so that they may be used collaboratively with science to elicit children's environmental understandings. "Many art educators today advocate a teaching philosophy that encourages children to think about the relationship of art, ecology and community" (Hurwitz and Day, 2008, p.19). The importance of being aware of children's environmental understandings for teaching and learning is clear, as good teaching practice builds upon what is already known to the learners. To build good teaching and learning models, researchers need to determine what children already know about environmental sustainability, and what feelings and attitudes they hold towards caring for the natural environment. Ideally, children feel a strong attachment to the environment and a passion for caring for it. As Burroughs (cited in White, 2004, p.6) acknowledges, "Knowledge without love will not stick. But if love comes first, knowledge is sure to follow".

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