



Children learning about biodiversity at an environment centre, a museum and at live animal shows



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ARTICLE INFO

Article history:

Received 30 May 2013

Received in revised form 28 August 2013

Accepted 4 September 2013

Available online 7 November 2013

Keywords:

Science education

Museum education

Zoo education

Biodiversity education

Environment education

ABSTRACT

This paper investigates informal biodiversity education in environment explorations, animal shows, and museum sessions. Participants (180) were ages 8/9, from London schools. Three data collection methods were used: pre- and post-visit activities, video recording, and post-visit interviews. Analysis was based on a socioecological literacy framework 'Earth Smarts'. Findings demonstrate differences in learning in each setting. When children took part in an environment exploration, the most commonly occurring learning code was motivation; meeting live animals resulted in the greatest evidence of species description, and visiting specimens led to species identification being most common. Codes have been conceptualised in the domains Skills, Place, Emotion, Attitudes and Knowledge (SPEAK) and are proposed as a tool to reflect on the aims of biodiversity education.

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Introduction

What do children learn when they take part in informal biodiversity education sessions?

The English curriculum for primary children includes scientific objectives of learning about variation and classification, and how living things are adapted to their habitat. Informal science learning settings such as outdoor sites and museums provide sessions to extend children's understanding of the natural world through taking part in enriching experiences (Braund and Reiss, 2004; Rickinson et al., 2004). Although the curriculum objectives that sessions in zoos, gardens and museums are intended to support are frequently identical, the active hypothesis of this research is that children's learning varies in different informal biodiversity settings. This focus was chosen as result of surveying United Kingdom informal education providers after the International Year of Biodiversity (Kimble, 2011). It is anticipated that there will be evidence to support the active hypothesis. However, the challenge lies in characterising the precise nature of the differences in learning for children in different settings.

This study focuses on three different settings within an urban context: an environment centre exploration, a live animal experience, and a museum with a natural history specimen collection.

The active hypothesis is informed by research into the traditions and funding priorities which underlie different informal biodiversity learning opportunities, and professional experience as a primary teacher and informal biodiversity educator and manager.

Learning through environment explorations

As a format, environmental explorations are well established (Jenkins and Swinnerton, 1996), starting at the end of the nineteenth century with Nature study to reconnect city children with the countryside. However, the purposes of outdoor engagement with the environment have followed governmental priorities over the years (Palmer, 1998). After the activist conservation movement in the 1960s, a clear milestone for biodiversity education was a summit in Rio De Janeiro in 1992, when countries signed to pledge support to protect biodiversity (Silvertown, 2010). This was followed by a number of high profile international meetings (see www.unesco.org) where biodiversity and sustainability issues were debated, often in relation to the Millennium Development Goals. Some people see biodiversity education as a postmodern approach to environment education (Dreyfus, Wals, & Van Weelie, 1999). The international meeting 'Rio +20' was held in 2012, addressing a number of current issues such as food security, climate change, and environmental economics.

Although these wider global priorities are ultimately implicated for continuing funding for biodiversity education, how does this translate into what children learn? Sauvé (2005) identified fifteen 'currents' or aims for environment education in Canada, showing a

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spectrum of purposes implicit in teaching. They range from developing a bond with the outdoors (Wilson, 1993) to developing 'ecological literacy' skills (Orr, 1995; Peacock, 2004). More recently, the importance of bringing in community approaches to the environment are being recognised, particularly where there are a number of different local perspectives (Stevenson & Dillon, 2010). Part of this research aims to understand how the traditions of informal environment education influence what children learn about habitats and adaptation when they visit an environmental education centre.

Learning through encountering live animals

Informal science education through meeting living animals has historic roots in the late 1800s and early 1900s, when leading sites such as London Zoo and the Bronx Zoo opened education departments (Baratay & Hardouin-Fugier, 2003). It is important to acknowledge that there are viewpoints opposing animals in zoos (Kiley-Worthington, 1990), and there is a distinction between organisations that prioritise profits from charismatic megafauna (Baratay & Hardouin-Fugier, 2003) and those that prioritise long term species preservation. Education has increasingly become a central objective for zoos (Patrick & Tunnicliffe, 2013) as the importance of spreading the conservation message has increased in profile. In 1993 E.O. Wilson stated that zoos must educate, argue and explain. In common with environmental education, increasing urbanisation is frequently cited as a key reason for why children should encounter living animals (Patrick & Tunnicliffe, 2013). The Society for Conservation Biology has set out the principles, concepts, goals and values of conservation literacy (Trombulak et al., 2004). One key idea in biology conservation education is that the living world is of personal worth to the learner. This is seen to be critical in order for children to take future positive actions towards conserving natural environments (Tunnicliffe, 2010). Zoos have a responsibility to promote the preservation of global diversity (Buffon Symposium, 2007). The extent to which this is based on research, animal management and communication activities varies between organisations.

However, it is now widely acknowledged that visitors' behaviour change as a result of encountering live animals is a legitimate and important outcome of a zoo visit, and one that zoo educators should plan for. A component of this research aims to understand how these perspectives influence what children learn about habitats and adaptation when they encounter live animals.

Learning through exploring a natural history specimen collection

The initial purpose of UK museums at the start of the nineteenth century was to educate adults, many of whom would not have had the opportunity for formal schooling. The need for an educated workforce in cities arose concurrently with the industrial revolution (Hooper-Greenhill, 2007), before universal education for all was established by Gladstone in 1870 (Turner, 1927). Like zoos, museum purposes have varied since their establishment between collection, preservation and public communication. John Hutchison was the first museum educator, at the Haslemere museum in England in the 1890s, and he was followed by 'Guide Educators' at the British Museum in 1911 and the Natural History Museum in 1912 (Kimble, 2009). These lone characters laid the foundations of learning from objects, experimenting with handling collections and using observation sheets to extend scientific understanding. A central tenet of animal specimen collections is understanding the science of taxonomy – the ability to identify and classify a broad range of species. After the Second World War museum education in England became more holistic as council funding increased for children's activities in the wake of family disruption (Palmer, 1954). In recent

years, themes of plurality, technology and globalisation have affected the relationship between museums and their visitors. Museums are epitomised as sites for free-choice learning (Falk, Randol, & Dierking, 2011). Current thinking is that the museum should be a 'hub for social dialogue' (Firmhofer, 2011) on site and online, as opposed to a didactic purveyor of knowledge and guardian of objects. Participation (Simon, 2011) and engagement (Black, 2005) are seen to exemplify ideal modes of learner–museum interaction. The near ubiquitous pervasion of internet access has cast the spotlight on objects as the unique selling points of museum visits; the aspects that cannot be encountered by other means. Learning programme development has reflected this by aiming to be object-rich, in consultation with teachers, for example, in the Natural History Museum in London (Collins & Lee, 2006). A section of this research aims to understand how this background influences what children learn about habitats and adaptation when they encounter natural history specimens.

Methodology

Identifying how the choice of setting affects children's learning was the main focus for data collection, which took place in Spring 2012. The research participants were one hundred and eighty children aged eight and nine, who attended state primary schools near King's Cross in London. Environmental exploration (EE) sessions took place at the London Wildlife Trust's Camley street nature park site, live animal shows (LA) were provided by educational company Animal Man Ltd and natural history (NH) specimen handling took place at the Royal Veterinary College in Camden. Some classes took part in sessions which involved one type of biodiversity activity alone, and others took part in sessions which combined more than one type of biodiversity activity, as shown in Table 1, in order to compare differences in learning.

A clear issue with trying to isolate the learning that results from informal biodiversity session are the many differing factors, owing to individual pupils' differences, class teaching styles, informal educator styles and session format. This research takes a critical perspective, acknowledging that the results are limited to these contexts; however, conducting and analysing research addresses a gap in the existing literature and lays foundations for informing future research.

The data collection schedule in Table 1 was designed to allow validation of results using a calculation to identify the learning taking place in one type of setting:

$$\text{Total EE learning minus total learning not EE} \\ (\text{Total per code in EE + EENH + EELA}) - (\text{Total per code in} \\ \text{NH + LA + LANH})$$

Likewise, for LA and NH. This allowed understanding across different classes and with different class teachers. Schools were

Table 1
Data collection schedule.

Day	Children's activities	Royal Vet College natural history specimen handling	Camley Street Natural Park Environment exploration	Animal Man Ltd. Live animal experience
1	NH			
2	EE			
3	LA			
4	EENH			
5	EELA			
6	LANH			

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