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The challenges of evaluating conservation education across cultures

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The present and future of biodiversity conservation embraces an interdisciplinary approach. In particular, the acceptance that social factors are a key component to understanding the challenges species and habitats face. Indeed, it is this growing understanding that may lead us to effective solutions to these challenges. Education is the most-used method employed to try and influence people and their communities. As such, it is widely utilized within conservation programmes around the world. However, the evaluation of educational outcomes is newish to the field of conservation, where so-called hard science has often dominated. This is, in part, the result of a lack of expertise with such evaluation methods in the conservation field but may also be because differences in culture require more flexibility in an evaluation approach. Here, a flexible approach to evaluation is presented; that is, the use of drawings in the style of Personal Meaning Mapping. In particular, the authors suggest this is one way of transcending the boundaries of culture, language and literacy.

Key-words: children; conservation; culture; drawings; education; evaluation; personal meaning maps.

INTRODUCTION

Over time, the approach to conservation has broadened from the more traditional application of the natural sciences to include social sciences. There is a recognition that conservation of threatened habitats and species can no longer be achieved without taking into account the effects of human impact on the environment. Fortress conservation, the belief that biodiversity is best protected by separating humans from the ecosystem in question (cf. Brockington, 2002), belongs to a bygone era; if indeed, it was ever a viable solution. In many conservation hot spots, rural communities are found adjoining conservation-management areas. The need to mitigate against human impact while embracing the principles of sustainable development is where the disciplines of social science take their place in the multifarious landscape that is 21st-century conservation (Brewer, 2001, 2002; Mascia *et al.*, 2003; Bride, 2006; Saunders *et al.*, 2006; Schultz, 2011; Heberlein, 2012). There are numerous models for education planning, typically with a common feature: the cycle of crafting measurable objectives, and using evaluation of those objectives to evidence impact and to make informed improvements to the programme. Design, delivery and evaluation of conservation education across countries and cultures present practical challenges for educators. Unlike generic field techniques (e.g. population census or habitat viability assessment) that may be applied as standard in different locations, education is culture sensitive and it cannot be assumed that tried-and-trusted techniques can be universally applied with equal success. Educators need to be creative, flexible and sensitive to local culture. This challenge includes how to approach and conduct evaluation, for if education is to be taken seriously as an aid to conservation, the same scientific rigour must be applied to evidencing impact as is applied in the natural-sciences discipline.

Evaluation that relies on quantitative data lends itself to the statistical analyses that the world of natural science recognizes as

rigorous and reliable. Commonly used quantitative evaluation techniques involving human participants include survey research, structured observation and straightforward counting of educational outputs (e.g. the number of participants). Being realistic about what can be achieved is paramount, and accessing participants for the purposes of research is often far from ideal. There are drawbacks to education evaluation that rely on the written word – namely rates of illiteracy, and the resultant issue of equal access and unrepresentative samples. In some cultures, the voices of children and women are never heard. Accessing women for the purpose of inviting opinion in interviews may be denied and expecting opinions to be openly expressed naïve. Conversely, a willingness to please (or other forms of response bias) may be more pronounced in some cultures and could undermine the value of more standard survey research. Different languages or local dialects present their own challenges where evaluation may be compromised by bias or inaccuracy in the translation process.

Children can be an important audience for conservation education. Where multigenerational families are closely knit, children who attend school can act as message multipliers, interpreting what they learn for and to their communities (Domroese & Sterling, 1999). They are also a relatively accessible audience as rural schools often welcome 'guest' educators who are able to bring new knowledge and a novel experience to the classroom (Plate 1).

A qualitative approach to education evaluation may provide a solution but this too is not without its drawbacks; not least because qualitative evaluation methods alone may lack the statistical characteristics that are so familiar to the conservation world. We believe that an evaluation approach that allows for participants to provide drawn responses addresses the challenges of language, illiteracy, and equal and open access. If the qualitative data from this approach also has the capacity to be converted into quantitative data, this may bring rigour and wider acceptance to the process. In particular, drawings lend themselves to child-centred evaluation as a means of allowing children's voices to be heard (see Barraza, 1999, for an overview of the use of drawings in education evaluation).

Personal Meaning Maps (PMMs) have been developed as a flexible approach to

Plate 1. Rural schools in India participating in the Assam Haathi Project welcome guest educators. The children act as message multipliers as they disseminate what they learn in the classroom to their families and communities. *Chester Zoo, UK.*

education evaluation where participants benefit from being able to use words or drawings, or a combination of both, to evidence their personal understanding and experiences. This approach takes into account different learning styles and abilities and allows multiple interpretations to be expressed. In particular where literacy levels are low, PMMs facilitate accessibility. Typically, participants are asked to describe or illustrate what they associate with an anchor statement or word that encapsulates the learning outcomes of the education intervention (Adelman *et al.*, 2000; Falk & Dierking, 2000; Falk & Storksdieck, 2005; Kisiel & Ancelet, 2009). This article does not seek to provide an in-depth explanation of the approach to analysing PMMs. Rather the wish is to share our experiences, from a practical perspective, of using PMMs in different cultural settings. However, a potted outline of the approach to analysis of drawings is offered as a pointer. The Falk *et al.*'s (1998) content-analysis scoring system for PMMs (with measures of quantity, breadth, depth and quality) was adopted, essentially for converting qualitative into quantitative data. This work provided a platform from which to develop an evaluation tool to address many of the challenges faced when attempting to evaluate conservation education in schools across different countries and cultures. The educators at Chester Zoo, UK, have used PMMs as an evaluation tool with 14–15 year-old schoolchildren, for conservation projects based in Mauritius, Tanzania and India (Table 1). Typically, these projects already had clear and measurable conservation objectives that are related to the habitat-protection work of the field biologists and the practical conservation of species. By extending the conservation initiative to include education components, it was possible to align our educational objectives closely with the overarching conservation objectives of the wider projects and, consequently, anchor statements for PMMs evolved from this.

LESSONS LEARNT FROM THE FIELD

Using our experiences of implementing PMMs as an evaluation approach for field conservation education, three key areas that need to be taken into account have been highlighted.

The culture of the classroom

The attitudes of teachers in different countries had a bearing on the evaluation procedure. In Mauritius, the classroom culture was formal, with teachers and sometimes head teachers patrolling the classrooms as children drew, bringing an examination atmosphere to what we had hoped would be a fun activity. One teacher attempted to hand out reference books; another had listed prompts on the classroom blackboard. The culture of the classroom was such that teachers were eager for their students to shine and sought to influence the content of the PMMs. In contrast, in Tanzania and India, after the protocol of meeting the head teacher or teachers, we were free to interact with children without a teacher presence. This resulted in a more relaxed atmosphere.

In Mauritius, we felt that we were putting the schools under pressure to allow time for this evaluation activity. It seems there is little opportunity to deviate from tight timetables and the delivery of an exam-driven syllabus. Once the PMMs were collected, we hoped to initiate group discussion to allow for inferences to be corroborated, and to add richness and depth to the process. This was only possible in Tanzania. It was not possible in Mauritius and it is doubtful given the culture of the classroom that children would have participated in discussion in any meaningful way. In India, the evaluation was conducted away from the school setting, and this may have added to the relaxed atmosphere. However, the need to bus the children back to school at the end of the field trip brought a different kind of time pressure and excluded group discussion.

COUNTRY	PROGRAMME/LOCATION	FOCAL SPECIES	RESEARCH DESIGN
Tanzania	Mkomazi National Park 'Rafiki wa Faru'	Eastern black rhinoceros *Diceros bicornis michaeli* African hunting dog *Lycaon pictus*	delayed post-test
India	Assam Haathi Project (human–elephant conflict) 'The Life of our Elephants'	Asiatic elephant *Elephas maximus*	pre/post-test (repeated measures)
Mauritius	Ile aux Aigrette Nature Reserve 'Learning with Nature'	Mauritius pink pigeon *Nesoenas mayeri* Mauritius olive white-eye *Zosterops chloronothos* Mauritius fody *Foudia rubra* Telfair's skink *Leiolopisma telfairii*	pre/post-test (repeated measures)

Table 1. Projects in range countries where educators from Chester Zoo, UK, have used Personal Meaning Maps and implemented a research design that measured either the educational impact (pre/post-test) or the prevalence of learning objectives (post-test only).

The ideal situation was free access to participants without a teacher presence and an allowance for post-PMM discussion to take place.

Attitudes towards drawing

Drawing came easily to the Mauritian children and they participated with enthusiasm, often appearing to be charmingly competi-

Plate 2. Drawing came easily to the children in Mauritius, who were enthusiastic and often amicably competitive with other students. *Chester Zoo, UK.*

tive in attempting to hide their work from the eyes of other students (Plate 2). At the field centre in India, the children spread themselves out in a relaxed manner over chairs and the floor and were eager to ask for more time to complete the task. We assumed that children all over the world would enjoy drawing. This was a false premise as was soon discovered in Tanzania. Despite being encouraged to draw and given coloured pens, almost all children provided written responses on their PMMs. In the team debrief that followed, we realized that there was no tradition of drawing in this culture (Plate 3). In classrooms barren of any teaching resources, apart from a blackboard (and sometimes chalk), and no drawing resources in the home, the idea of expression through drawing was relatively unfamiliar. The flexibility of PMMs was demonstrated here, although there was the additional challenge of having the written responses translated.

The robustness of the PMMs depends on forward planning and for education initiatives to have clear learning objectives at the onset. This allows for an unambiguous statement that reflects those learning objectives to anchor the PMMs. For example, following a guided lesson on a Mauritian nature reserve islet, where the focus was the restoration of the habitat and fauna to its precolonization condition, the PMM anchor statement was 'Imagine you are a sailor landing on the island four hundred years ago. What did you see?' Best practice also includes piloting the statement. Clarity in the design and analysis of the PMMs was possible where good forward planning was in place. In Mauritius, Tanzania and India, education planning involved the crafting of clear learning objectives, which made it possible to run the PMM activity with some confidence.

Methodological implications: measuring educational 'impact'

Poorly resourced schools welcome education resources, particularly if these are free, which they inevitably are when provided by the international conservation community. However, the provision of such resources is an educational output, not an outcome and in no way a valid measure of impact. Thus, providing educational materials is relatively easy. Ensuring that any education initiative is underpinned by measurable learning objectives is more chal-

Plate 3. Children in Tanzania had no experience of drawing and often provided written answers rather than expressing themselves with illustrations. There was no tradition of drawing in this culture. *Chester Zoo, UK.*

lenging, as without clear objectives it is almost impossible to implement meaningful evaluation research.

A key methodological concern in education evaluation is being clear on what is actually being measured. Educational 'impact' is a term often used rather loosely in evaluation studies. We believe that impact can only be demonstrated (with validity) by implementing a research design where the magnitude and direction of change (e.g. positive or negative) can be measured in individuals (Moss & Esson, 2013). Where this magnitude and direction are known, greater confidence can be placed in the causal nature of the educational programme/intervention on the outcomes of the participants under study. This generally necessitates a pre/post-test, repeated-measures approach. Unfortunately, this is usually the most difficult, resource-demanding, design to implement; one which simply may not be possible in many field environments.

Post-test only evaluation makes it much more difficult to uncover the actual impact of an education programme, as the starting point of participants is unknown. Therefore, as a method for measuring impact, it is of limited benefit. However, if clear, measurable learning objectives have been put in place, a post-test only evaluation can yield valuable insight into the content of the education programme itself. For example, if three learning objectives have been developed for a taught education programme but only two of the objectives show up consistently in the evaluation, then it is clear that the taught programme is not functioning optimally for participants. From a practical point of view, having solid research evidence to inform future education programme development is invaluable. Post-test only data can deliver such evidence, with a minimum effort and staff investment, if clear learning objectives are in place.

CONCLUSION

The varied cultural landscape found across the world needs to be factored in to any attempt at evaluating conservation education programmes. The use of drawings – or, more specifically, PMMs – is a valid approach to providing robust, quantifiable evaluation evidence, while simultaneously mitigating against cultural issues commonly encountered in the field; those of language, illiteracy, and equal and open access. PMMs are not the perfect solution for every situation; however, our experiences from three, culturally diverse, countries led us to believe that they are an important additional tool for those seeking to understand the outcomes of conservation education.

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