# Critical Contextual Reviews and Development of Interpretive Materials with Teachers in Kenya

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**Abstract** This paper shares findings from a recent study that engaged a group of Kenyan teachers in a review and development of interpretive materials through a participatory action research framework. It focuses on critical contextual reviews of interpretive materials in non-formal organisations and development of similar materials in schools with teachers. Social interactions between teachers and non-formal educators enabled the sharing of ideas, skills and techniques on materials development processes. This provided a basis for developing interpretive materials to support environmental learning within school grounds. A teacher-centred approach to materials development as argued in this paper seeks to respect the needs of schools within their social and historical contexts. It further challenges the conventional top-down approaches in which non-formal educators are creators of materials and teachers are viewed as "technicians" who implement the materials in schools. The paper offers some tentative guidelines on the development of interpretive materials in schools.

## Introduction

Teachers from two Kenyan schools were involved in a participatory action research study between 2001 and 2002 that reviewed and developed interpretive materials to foster environmental learning within their grounds. Prior to this study the two schools; Samaj and Kenya High had approached National Museums of Kenya (NMK) where I worked as a botanic garden educator for support to develop interpretation sites in their grounds. Teachers from Samaj wanted to develop a "botanic garden" modelled on the one found at NMK. Those from Kenya High were interested in developing a themed nature trail in a forested section within their school. This motivated me to design a study that would enable the development of these resources *with* the teachers and not *for* them.

The aims of this study were to review how interpretation resources and materials were developed and used within the non-formal education sector; draw on emerging findings and develop similar resources for environmental learning within schools; and explore a perspective of interpretation as an environmental education process. I undertook the study in two phases. The first phase (review phase) involved making visits with teachers to five non-formal education organisations within Nairobi to review how

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interpretation resources and materials were developed and used. These organisations were National Museums of Kenya (NMK), Kenya Wildlife Services (KWS), Wildlife Clubs of Kenya (WCK), the Butterfly Centre and the Giraffe Centre. In the second phase (development phase), teachers drew on techniques, social relations, skills and knowledge they acquired during the review phase to develop interpretation resources and interpretive materials in their schools.

By interpretation resources, I refer to sites that have been developed to enable environmental learning processes through encounters with real objects. Such sites include nature trails, botanic gardens and game parks. Interpretive materials (for example, trail leaflets and brochures) are the illustrative media designed to "mediate" environmental learning at such sites. This paper is based on findings from critical contextual reviews of interpretive materials and development of similar ones with teachers.

## Context of the Study

Non-formal education organisations in Kenya play a major role in providing environmental education programmes for school groups. These organisations are involved in the development of interpretive materials to support environmental learning in schools. However, many of these materials are developed through top-down approaches and without the participation of teachers. Such approaches that use research, develop, disseminate and adopt (RDDA) strategies have been critiqued by many authors (for example, Robottom, 1987; O'Donoghue, 1988; O'Donoghue & McNaught, 1991; Cornbleth, 1990; Lotz, 1996; Winberg & Kerffot, 1997).

According to Cornbleth (1990), materials developed in a technocratic manner tend to treat learning activities as if they were independent of their location in an education system. Robottom (1987) argued that institutionalised language in materials development reflects an authoritative stance that leaves little room to draw on the theory and practice of teachers. A lack of participation by teachers in materials development reflects an assumption that teachers are practitioners and are only required to put into practice what has been developed elsewhere (Lotz, 1996; Winberg & Kerffot, 1997). I undertook this study to challenge this assumption and promote a teacher-centred approach to materials development for use in school grounds.

## Methodology

This study drew on features of participatory action research as articulated by Kemmis and Wilkinson (1999; see also Kemmis & McTaggart, 2000). According to Fien and Hillcoat (1996), participatory action research is an effective form of critical research as it seeks both research and action outcomes. I provided opportunities for social interactions between teachers and non-formal educators to actively generate and apply knowledge on materials development. These interactions occurred through a spiral of self-reflective cycles of planning, acting on the plans, reflecting on the results and then re-planning. Data was generated through focus group interviews, document analysis, workshops, observations, photography, taking notes, audiotape recording and journal writing. Meanings were drawn from data through use of comparison, noting themes and triangulation. I addressed issues of rigour and validity through use of critical friends and self-corrective techniques of face validity, catalytic validity and construct validity (Lather, 1986; Cohen, Manion & Morrison, 2000).

## Critical Contextual Reviews of Materials

The review phase of this study revealed the existence of various interpretive materials in non-formal education organisations. They included interpretive signage,

trail booklets, videos, interpretive labels, worksheets, interactive displays, posters, teachers' packs, exhibitions and brochures. A sample of these materials was reviewed with teachers from Kenya High and Samaj to identify practices and key shaping ideas on how they were developed and used. Critical contextual reviews of the materials were undertaken within a negotiated framework during focus group interviews with non-formal educators and document analysis in workshop sessions. Understanding, skills and values associated with interpretive materials development were explored by critically reflecting on a number of themes with the teachers. These were on the roles played by the non-formal educators in materials development; views on education and environment supported by the materials; the values reflected in the materials; the design and appearance of the materials; and the applicability of the materials to school contexts. Information on these themes were synthesised to capture materials development practices within the non-formal education organisations. Table 1 is a summary illustrating some of the information.

As illustrated in Table 1, a number of themes are evident from our reflexive processes of critical contextual reviews with teachers. Those themes that indicate patterns associated with use and development of materials within the non-formal education sector are examined. They highlight the relationship between interpretation and its potential to enable environmental learning through social construction of meanings in context.

### *Levels of Teacher Participation*

Teacher participation in the development of interpretive materials was limited to only a few examples. There were cases where teachers formed part of the development team, however, the presence of teachers on such a team did not necessarily imply enhanced teacher participation. For example, we found out that in the development of the WCK ecology pack, the three teachers who were part of the team were not involved in the initial conceptualisation of the pack idea.

The importance of involving teachers in materials development cannot be over-emphasised. Ballantyne (1998) noted that establishing an ongoing relationship between non-formal educators and teachers through collaborative materials development can help maintain the continuity between formal and non-formal learning environments. Non-formal educators provide a range of learning opportunities that may support learners in the discovery of real-life examples of principles, problem and issues (Ballantyne & Uzzell, 1994) through dialogue, encounters and reflection in the context of action taking (O'Donoghue & Janse van Rensburg, 1995).

### *Education Theories that Informed the Development Processes*

Trail booklets and teachers' packs were designed to support environmental learning processes through encounters with real objects in the environment. This reflected education theories from social psychology (constructivism) on how meanings are socially constructed in context (Berger & Luckmann, 1966; Vygotsky, 1981; Charon, 2001). Learning activities sought to mobilise learners' skills, knowledge and social relations acquired in schools contexts for meaning-making processes. The perceived role of non-formal educators when developing these materials were those of organising learning opportunities to enable learners to apply skills, knowledge and social relations acquired in classroom contexts to meaning-making processes in the outdoors.

Development of interpretive signage and posters seemed to reflect perspectives on knowledge transmission. Most signage was information-led and aimed at communicating environmental knowledge to change the behaviour of learners (see Hungerford & Volk, 1990; Howard, 1998). For example, a lot of information was included in the Giraffe

TABLE 1: Themed Analysis of Some of the Materials Reviewed

| Themes | Trail Booklets | Teachers' Packs | Posters | Interpretive Signage |
|---|---|---|---|---|
| Occurrence and context of use | Found at WCK, NMK and Giraffe Centre. Used for guided tours of nature trails. | Found at NMK and WCK. Used to engage learners in ecological hands-on activities. | Found at NMK and Giraffe Centre. Distributed to schools countrywide. | Occurred at NMK, KWS and Butterfly Centre. Learners read information displayed. |
| Curriculum links | Links with biology and geography curriculum. | Had links to the science curriculum. | Had broad links to the school curriculum. | General school curriculum links for all levels. |
| Material development processes | Developed through in-house consultations and sometimes with external experts. | Developed through a consultative process that involved teachers. | Giraffe Centre poster was developed in-house; NMK one had external input. | Developed through a consultative process involving experts and consultants. |
| Learning and teaching processes | Learners interact with real objects though assistance with non-formal educators. | Learning involves interacting processes of reflection and encounter. | Learners read information to attain awareness on environmental conservation. | Learners read and relate texts with displayed objects for meaning-making. |
| Educational theories reflected in texts | Meaning-making processes in context take place through social interactions. | Learners socially construct meanings through interactions with peers and adults. | Transmission of knowledge based on a one-way form of interaction. | Transmission of scientific facts aimed at changing behaviour. |
| Views on the environment reflected in texts | Environment viewed as a medium for education. | Environment viewed as complex interactions between life and physical components. | Emphasis on environmental management through creation of awareness on conservation. | Environment viewed as 'something' to be conserved and managed. |
| Values supported by texts | Values on social and ecological sustainability promoted. | Supported values on biodiversity conservation and social justice. | Posters supported values on biodiversity conservation. | Supported values on biodiversity conservation. |
| Role of evaluation | Limited evaluation during development. | Evaluative comments from teachers used. | Limited to formative evaluation. | Only reported at KWS. |

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Centre poster to create awareness on the conservation of the endangered Rothschild giraffe in Kenya. However, such an information-led approach to environmental learning has been found not to always lead to a behaviour change in learners (Uzzell, 1998a).

Texts in some materials reflected perspectives from critical pedagogy (see Greenall Gough & Robottom, 1993). Activities found in the WCK ecology pack seemed to encourage active engagement of learners in collaborative investigations of real environmental issues in local environments. This can present opportunities for dialogue between learners, educators and real objects to foster environmental learning. During such meaning-making processes, learners bring their own social experiences, emotions and environmental values into play (Dierking, 1998).

### *Forms of Interpretation Supported by the Materials*

Interpretive materials supported three forms of interpretation: self-mediated, mediated and critical interpretation. In self-mediated interpretation, learners only interact with interpretive materials that have been created by non-formal educators to foster environmental learning. Interpretive signage and posters seemed to support this form of interpretation as they encouraged learners to obtain information about the environment through reading and looking. Most of the interpretive signage found at the organisations was more informational than interpretive. The signage was developed on the assumption that environmental learning takes place as a consequence of reading interpretive panels. However, it is the discussion that is encouraged by interpretation that leads to environmental learning (Uzzell, 1998c).

In mediated interpretation, there is a focus on the interactions between non-formal educators and the learners; and also interactions between the learners themselves. These interactions were enabled through the use of trail booklets, worksheets and teachers' packs by non-formal educators. Mediated interpretation through guided questioning has the potential of provoking learners to explore environmental issues through inquiry processes. Interpretive materials that further engage learners in the active generation of new knowledge following mediated interpretation support a critical-oriented form of interpretation. Such materials have explicit action-oriented learning and teaching processes that encourage critical reflection in learners for social change. For example, learning activities in some materials such as the NMK teachers' pack were developed to create opportunities for learners to engage in critical educational processes through problem-solving.

### *Links to the School Curriculum*

All materials except for a publicity brochure from the Giraffe Centre had direct links to the school curriculum. Some, like posters and interpretive signage, had very broad links while others, like the WCK ecology pack and trail booklets, had been specifically developed to supplement the teaching of secondary school biology and geography curriculum. In this way, the non-formal education organisations are playing a major role in supporting interpretation and education processes amongst school groups. They have endeavoured to develop interpretive materials that match formal education needs to ensure frequent visits by school groups (see Ballantyne & Uzzell, 1994).

### *Environmental Perspectives Supported by the Materials*

Development of posters and interpretive signage was based on scientific knowledge that projected technocratic environmental perspectives (Huckle, 1993; Job, 1996). Texts in these materials focused on the management of the environment with particular emphasis on changing learners' behaviour. Activities in trail booklets supported a perspective of the environment as a medium for learning. These activities aimed

to mobilise learners' skills, knowledge and values acquired in classrooms to foster environmental learning.

*Underlying Values in Materials Development Processes*

Most materials had environmental learning activities that could engage learners in exploring values that promote both ecological sustainability and social justice (Fien & Tilbury, 1998). Activities in trail booklets promoted values of interspecies equity, a communal obligation to conserve biodiversity, living lightly on the earth and respect for nature (IUCN, UNEP & WWF, 1991; McKeown, 2002). The following extract from the NMK booklet supports this claim.

> Carefully, remove the fallen leaves on a patch in the ground. Scratch the soil using a stick. What do you see? ... Most soils in tropical forests are relatively poor. Why is it wrong to cut down the remaining forests in Kenya (which account for less than 2.6% of the total land area) in order to plant crops? How can we ensure that we retain our indigenous forest, but also feed the growing Kenyan population? (NMK, 2001, p. 3).

This example highlights how learners can be engaged in exploring values that focus on both social justice and ecological sustainability within the local and wider contexts. Interpretation becomes educational acts of mobilising learners' cultural capital in a local interpretive setting in order to engage them in investigation, social critique and taking action to participate in social change.

*Evaluation Role and its Funding Implications*

Evaluation as an integral component in materials development did not feature much in the materials we reviewed with teachers. Evaluation processes were influenced by the availability of donor funding, amongst other factors. For example, in the development of the NMK wetland poster, it was not possible to evaluate the effectiveness of the material after its implementation, due to a lack of funds.

Uzzell (1998b) and Beckmann (2000) have argued that cost should not be an issue in carrying out evaluation processes that require the re-examination of the effectiveness of interpretive materials that foster environmental learning. A simple checklist (Ballantyne & Uzzell, 1994) may be developed and used to critically evaluate interpretive materials in terms of their relevance to the school curriculum; qualities and principles of interpretation (see Tilden, 1977; Ham 1992); costs and durability; flexibility in use and reproduction; accuracy in information; and values observed during reproduction.

## Key Stages in Materials Development Processes

Our contextual critical reviews of interpretive materials revealed a number of stages underlying materials development processes within the non-formal education sector. They are:

- Identification of the need for new material by non-formal educators;
- In-house consultations on environmental themes to focus on;
- Formation of a development team that may incorporate external experts (e.g. naturalists);
- Literature search on the themes to be interpreted;
- Writing of the interpretive text by drawing on educational ideas and theories;
- Designing of the material and identifying relevant illustrations and pictures to support texts;

- Production and piloting of draft material; and
- Editing and production of final draft either in-house or with a commercial printer.

An example focusing on the development of an ecology pack at WCK is shared to demonstrate these development stages in action.

*Development of an Ecology Pack at WCK*

This pack was developed in 1991 by a team of twelve people that included WCK staff, experts from other organisations and three secondary school teachers. Educators at WCK used the pack to give slide talks to visiting school groups before facilitating ecological studies at both WCK nature trail and the neighbouring KWS Nairobi National Park. Such active engagement of learners with real objects in an interpretive setting has the potential of enabling meaning-making processes that can lead to critical reflection and action for social change.

The development of the pack reflected qualities of interpretation of communicating environmental information in an enjoyable, relevant, organised and thematic manner (Ham, 1992). The process started with in-house consultations to determine themes for interpretation. Through a thematic approach, information in the pack was made more relevant and personal to the learners to engage them in the subject being interpreted. During a literature search texts on identified themes were drafted and supported with good quality photographs to capture the attention of learners. These texts made environmental links to the school curriculum in the contexts of cultural and natural features within the interpretive settings at both WCK and KWS.

To make the pack captivating, an artist within the development team did the layout and design. To ensure information accuracy the WCK education staff proof read the final draft of the pack before taking it to a commercial printer. Production costs were minimised through bulk printing on cheaper paper; not using colour photographs; and spiral binding of the final copies.

## Developing Interpretive Materials with Teachers in Schools

The development of interpretive materials occurred through focus groups and informal meetings with teachers in their schools. The process drew on findings from critical contextual reviews of materials as earlier mentioned. This enabled us to explore a perspective of interpretation as an education process through materials development actions. We developed several interpretive materials that included brochures, worksheets, interpretive signage and trail leaflets. In addition, we also developed a school-based "botanic garden" and an "arboretum" with a themed trail at Samaj and Kenya High respectively. This actualised the potential of interpretation as an educational activity within school grounds that aims to reveal environmental links to the curriculum. Promoting school grounds as sites for environmental learning has the potential to provide a way of overcoming the separation in practice, as well as in theory, between "classroom knowledge" that is usually acquired didactically and "action-knowledge" (Wells, 2000). This requires interpretive materials and experiences that enable learners to find their own personal meaning through critical reflection.

An example of how such materials were developed with teachers through a participatory and open-ended process follows. This example focuses on the development of a trail leaflet to support environmental learning at a "botanic garden" we developed at Samaj.

*Developing a Trail Leaflet at Samaj School*

In collaboration with a team of five teachers we developed a simple A4 trail leaflet to enable self-guided tours for learners at the Samaj "botanic garden". As a medium of interpretation (Ham, 1992), a trail leaflet has the potential for offering environmental information as well as mobilising learners' capital for meaning-making processes through social interactions. It can be used both in the classroom and in the outdoors. However, a trail leaflet has the disadvantage of being a one-way form of interaction when learners use it in the absence of more culturally knowledgeable adults.

The development process followed a participatory action research model that involved a spiral of self-reflective cycles of planning, acting and reflecting. The emphasis was on the process, rather than the product, with an overriding aim of enabling the teachers to become material developers and interpreters in their own right. During the planning sessions, we decided on the overall theme for the trail, the number of stops and features for interpretation and the design of the trail leaflet. The overall theme for the trail provided a storyline that was supported by all the stops along the trail as a way of presenting a whole rather than a part (Tilden, 1977). The texts were written in a simple language and story form to reveal messages on specific themes. We wrote thematic titles for each stop to capture the attention of learners. One such thematic title was: "Plant vitamins are made here!" This provided a storyline on the orchard section of the "botanic garden". School curriculum links were made explicit using critical questions that were posed in the texts as problems to be solved.

Interpretive texts that we generated for all the stops were synthesised into a first draft. The draft was critically evaluated using a checklist (Ballantyne & Uzzell, 1994) that we had produced before the development process. Theme titles were revised, graphics for stops suggested and information verified for its accuracy. We designed and produced an A4 trail leaflet with three folds (six pages) as a second draft. This was further critically evaluated in a workshop attended by other teachers from Kenya High. In this way, the development process was not to be viewed as an end in itself but as a process open to comment, critique and revision.

## Guiding Principles on Developing Interpretive Materials in Schools

Based on findings from this study, guiding principles that may inform teachers when developing interpretive materials for use in their school grounds are suggested below (see also Ballantyne & Uzzell, 1994; BGCI, 2000). These guidelines emphasise both the processes of development and the content of interpretive materials.

- Materials should be developed through an inclusive and participatory process based on appropriate educational ideas that illuminate how learners construct meanings within interpretive settings;
- Materials should promote processes of communicating information that can stimulate an interest in the learners for the subject being interpreted towards a more critical engagement with environmental issues;
- Materials should engage learners in problem posing (through follow-up activities) to enable them to critique and challenge what is being interpreted. They should also encourage active engagement of learners in collaborative investigations of real environmental issues in local interpretive settings;
- Materials should allow for a mobilising of learners' skills, knowledge and social relations for critical and action-oriented environmental learning activities;
- Materials should enable learners to explore values that promote ecological sustainability and social justice within local and global contexts (see Fien & Tilbury, 1998);

- Materials should have accurate and up-to-date information that enables learners to relate to the subject being interpreted;
- Materials should propose diverse learning and teaching approaches in their texts that encourage qualitative and educational interactions; and
- Materials should be easy to use and appropriate to the levels of the learners; they should also be flexible for use both in the outdoors and in the classroom.

Nonetheless, these guiding principles are tentative insights gained from this study and are subject to revision. They only serve as a starting point to be drawn on by teachers and non-formal educators interested in enhancing environmental learning within school grounds. Materials developed within these guidelines are likely to support mediation of social interactions amongst learners in ways that may strengthen critical reflection and action.

## Conclusion

This paper has reported on how teachers from two Kenyan schools were engaged in critical contextual reviews of interpretive materials found in five non-formal organisations. Social interactions between teachers and non-formal educators enabled a sharing of ideas, skills and techniques on materials development processes. This provided a basis for developing interpretive materials to support environmental learning in school grounds.

Participatory action research as a form of critical research provided an appropriate method for enabling teacher participation in social and educational change. This paper has shown that finding solutions *with* teachers is more empowering than finding solutions *for* them. Non-formal educators should therefore work with teachers through collaborative materials development to enhance the continuity between formal and non-formal environmental education. A teacher-centred approach to materials development as argued in this paper seeks to respect the needs of schools within their social and historical contexts. It further challenges the conventional top-down approaches that de-contextualise environmental learning activities and marginalise teachers in materials development.

I hope this paper will open up further possibilities for exploring interpretation and environmental education in relation to their purpose in fostering environmental learning processes. There is a need to broaden the theoretical base of interpretation as an education process by re-orienting interpretation interactions towards socially critical environmental education processes. It is a re-orientation that entails a shift from viewing interpretation as a leisure activity in non-formal interpretive sites to one that articulates the potential of interpretation as a way of fostering critical environmental education in schools.

*Keywords*: Materials development; interpretation; non-formal education; teacher-centred approach; school grounds.

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