



Educational initiatives

The effectiveness of an environmental management system in selected South African primary schools

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ABSTRACT

Environmental management systems were designed to be used by industrial organisations. However, in recent years, some educational institutions have implemented environmental management systems in appropriate administrative frameworks. The existing literature does not adequately address environmental management systems as tools for harmonising the environmental, social and economic realms of education for sustainable development at primary schools. The aim of this paper is to report on research into the effectiveness of environmental management systems in education for sustainable development at 60 primary schools in four provinces of the Republic of South Africa over a period of two years. A baseline survey and post-baseline surveys assessed the integration of water-, waste-, energy- and garden-related characteristics into extra-curricular activities and into the strategic visions of schools implementing environmental management systems. The data were evaluated using Cohen's effect sizes and Spearman's correlation coefficients. The results show that an environmental management system is helpful in education for sustainable development because changes in group knowledge, skills and actions that are required to address environmental features were observed. Environmental characteristics were integrated into extra-curricular school activities and into the strategic visions of the management of the schools with varying levels of success. Systems that simultaneously considered environmental, social and economic factors seemed to have been more successfully implemented than those focused only on environmental and social considerations.

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1. Introduction and problem statement

In 1992, the United Nations Conference on Environment and Development (UNCED), held in Rio de Janeiro, drafted *Agenda 21*, which highlighted the potential role played by education in creating the awareness necessary to protect the environment and contribute to sustainable development (Rickinson et al., 2009; Peeters, 2003; Veleva et al., 2001). Chapter 36 of the *Agenda* states that “education is critical for promoting sustainable development and achieving environmental and ethical awareness, values and attitudes, skills and behaviour consistent with sustainable development and for effective public participation in decision-making” (Earth Summit, 1992). The World Summit on Sustainable

Development (WSSD), held in Johannesburg in 2002, proposed to implement Resolution 57/254, which declared the 2005–2014 period to be the United Nations Decade of Education for Sustainable Development (UNDESD) (Haigh, 2009). The basic strategic vision of the UNDESD was to create a world where all human beings had the opportunity to benefit from education and to learn about the values inherent in environmental protection (UNESCO, 2006). The UNDESD expressed a commitment to integrate Education for Sustainable Development (ESD) at all levels of education and training systems (UNESCO, 2006).

Recently, the concept of ESD has also been developed in educational policies around the world to reframe environmental educators' contributions to sustainable development (Jickling and Wals, 2008). However, the adoption of a sustainable development credo in education presents major shortcomings relating to anthropocentric bias and a denial of the intrinsic value of nature (Kopnina, 2012a, b; Sauv e, 1996; Selby, 2006). Such shortcomings to ESD can, however, be offset by implementing an environmental management system (EMS) in education. This will support a learning process implemented by a school organisational structure

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regarding environmental, social and economic factors. An EMS involves stakeholders who have eco-centric interests and who intrinsically value nature. Thus, the implementation of an EMS in the context of an educational learning process is intended to “cut across disciplines and management structures to embrace the widest possible audience of participants. An EMS will have implications for the assumptions and beliefs shared by staff members, learners and other stakeholders; an EMS is deemed essential to prove their self-awareness and environmental conscience” (Ferreira et al., 2006).

EMSs were not originally designed to be used by educational institutions, nor were they designed to address economic problems of society. Instead, they were designed as a part of an overall management system which includes practices, procedures, processes and resources for determining and implementing a firm's overall aims and principles of action with respect to the environment (Chan and Hawkins, 2012). However, the organisational structure of an EMS can help to move ESD beyond the confines of academic education and influence the environmental, social and economic features of society in a primary school context to sustainable levels (Haigh, 2006).

The literature shows that some educational institutions, mostly located in the developed parts of the world, have already implemented an EMS to position ESD in an appropriate administrative framework and to provide benefits such as improved environmental, social and economic performance (Disterheft et al., 2012; Jain and Pant, 2010; Sammalisto and Brorson, 2008; Savely et al., 2007). However, these sources merely present the qualities and rewards of an EMS in education and in the learning process. They lack a practical manifestation of the International Organisation for Standardisation (ISO) 14001 (MacDonald, 2005) standards for an EMS's role in harmonising the real-life environmental, social and economic domains of ESD in a primary school context. The research presented in this article attempts to address that deficit.

The aim of this paper is to report on research into the effectiveness of environmental management systems in promoting ESD at 60 primary schools in four South African provinces over a period of two years, from 2009 to 2011. The research had two objectives. First, it assessed the extent to which environmental, social and economic activities focussing on water, waste, energy and gardens were implemented into extra-curricular activities. Second, it assessed the extent to which these features were included in the strategic visions of school management at the selected South African primary schools. It was thought that stating these research objectives would contribute to the effectiveness of the EMS because they specified tangible outcomes to be achieved by South African primary schools involved in the project. The research question was as follows: What is the effectiveness of the ISO EMS 14001 on ESD at selected South African primary schools?

The remainder of this paper is structured as follows: First, it explains the context of the research by describing the EMSs involved in the empirical setting of this study. Second, the conceptual and theoretical framework of the research is outlined in the form of an elucidation of EMSs in general, the particular framework followed and the structure utilised. The theoretical framework explains how the adapted ISO 14001 EMS framework can fit into a social learning view of ESD. The next section of the article explains the methods and tools used in the research process, including the statistics applied. The results of a paired *t*-test are then presented to quantitatively show the degree of integration of environmental features into the extra-curricular school activities after one year and two years of implementation. This is followed by the results section, which shows whether environmental features were indeed instilled into the strategic visions of the schools' management from the onset to the end of the project. Then, follows a discussion of the

usability of the method and tools beyond the South African context, of the contributions of the adapted ISO 14001 EMS to ESD in South African primary schools, and of the extent to which the environmental features of water, waste, energy and school gardens were implemented in extra-curricular school activities and into the strategic visions of the management of the respective schools. Finally, conclusions are drawn about the implications of the results of the study for schools, policies and contributions towards ESD.

2. Context of the study: EMSs in education

A literature review regarding EMSs in education reveals that they are used as management tools. A South African study by Hens et al. (2010) and a report by Sleurs (2005) from Belgium provide illustrations of EMS practices in primary school contexts for a developing and a developed country, respectively. Environmental educators in these two countries have collaborated since 2005 to enhance the EMSs of South African primary schools. Note was taken of the studies by Carreiras et al. (2006) and Disterheft et al. (2012), which describe instruments and a framework for the implementation of the EMS in European higher education. The following questions were used as basis for the review of EMSs in the aforementioned studies:

- What curricular approach was used?
- What were the limitations of this approach?
- Which environmental features were addressed in the EMSs?
- What are the limitations of these environmental features in terms of addressing the environmental, social and economic dimensions of sustainable development in primary schools?
- What environmental features are to be included to address the limitations of the EMSs?
- How do these features address the environmental, social, and economic dimensions of sustainable development in primary schools?

The study by Hens et al. (2010) focused on the assessment of water-, waste-, energy- and greening-related features in the eight subjects of the formal primary school curriculum. This focus is similar to that of the Sleurs (2005) report, where schools had to choose between one or more of the following themes: waste management, mobility, water, materials, greening at school, kitchen energy and the canteen. The Carreiras et al. (2006) study used an SWOT analysis to assess environmental features that were integrated by means of the traditional and participative approaches. The traditional approach is embedded in a continuous improvement philosophy based on the cycle “Plan, Do, Check and Act”, whereas the participative model consists of two parts: the environmental part, in which the strategies and actions were integrated to increase the environmental performance at *Escola Superior Agrária de Coimbra (ESAC)*, and the social part, which focused on the definition of strategies and actions to make the ESAC community aware of environmental management advances. The Disterheft et al. (2012) study furthermore showed that, for EMS implementation at 47 European universities, a mix of top-down and participatory approaches relied on ISO 14001 or non-formal EMSs, whereas those universities that opted for Eco-Management and Audit Schemes (EMAS) opted for the participatory approach. A mix of top-down and participatory approaches was found to have promoted empowerment, which creates awareness and understanding of environmental issues.

The approach used in Hens et al. (2010) and Sleurs (2005) is mostly cross-curricular because it focuses on the assessment of environmental features in all subjects of the formal school

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