Abstract

The effective teaching of water resource management is critically important to the future sustainability of Botswana, considering that water resources are a shared and scarce resource, unevenly distributed over time and space. Preliminary research (Mosothwane, 2002; Mogotsi, 2007; Ketlhoilwe, 2003/7) suggests that teachers in Botswana struggle to select suitable teaching strategies for Environmental Education (EE)-oriented topics. For this reason, the introduction of Environmental Education (EE) into the Social Studies curriculum could potentially pose a challenge for Batswana teachers to construct and use Pedagogic Content Knowledge (PCK) to teach the topic of 'Water Resources and their management' effectively. Teachers would need to develop a nuanced understanding of EE core concepts to enable them to use appropriate pedagogic methods that promote students' sustainable approaches to environmental management of resources. Environmental education means much more than environmental awareness; it also encompasses the understanding of issues, concern for the environment and a commitment to the wise and sustainable use of resources. This implies a need to link subject knowledge to an appropriate pedagogic approach. Research has established that there exists a relationship between teachers' knowledge of the topic to be taught, their beliefs and their ability to transform content knowledge into a form that is appropriate for teaching. My study, therefore, explores teachers' beliefs about teaching, their environmental worldview and their understanding of EE teaching. I assess their content knowledge on the topic of Water Resources and their Management in Botswana, establish the extent to which they are able to portray topic-specific PCK, and use this knowledge to make appropriate pedagogic choices. I analyse the extent to which their beliefs and understanding of teaching, EE and their content knowledge enable them to approach the topic, Water Resources and their Management in Botswana for effective teaching.

The theoretical framework of the study relies on Shulman's knowledge bases for teaching and Palmer's components for teaching and learning in EE, that is, *in*, *about* and *for* the environment. These were instrumental in developing the data collection tools and the analysis of the data. I used a small selection of participants - Social Studies teachers in Botswana - for data collection purposes rather than a huge survey. The data collection was done through questionnaires,

belief tests, Content Representations (CoRes) and lesson planning. Data analysis relied on Shulman's knowledge bases for teaching and Palmer's components for teaching and learning in EE, that is, *in*, *about* and *for* the environment, formed the base of my theoretical framework.

The findings of my study indicated that the teachers' understanding of what it means to teach effectively foregrounds the role of providing care and backgrounds to the mediation of knowledge. While teachers professed concern for the environment, these concerns were not translated into learning tasks that might develop such concerns, awareness and commitment to environmental sustainability. Although teachers were well able to describe students' prior knowledge, they struggled to articulate how the topic fitted into the curriculum, what constituted appropriate representations of the key issues and which teaching strategies would be most appropriate. My findings further showed that, although the teachers possessed knowledge about water and its use, abuse and management in the country, they did not design lessons that provided opportunities for links between students' experiences in their communities. Instead, the lessons developed provided a variety of generic teaching strategies that were not EE-specific. Their selection was unjustified, lacking Pedagogical Content Knowledge (PCK). The proposed teaching strategies showed no evidence of transformation of the content-specific to EE, did not take into account the students' prior knowledge and were also not closely connected to the goals of EE for motivating students to adopt sustainable lifestyles.

The implications of the findings of this study suggest that there is a gap between EE policy intentions in Botswana and the implementation of EE in secondary schools. Although teachers appear to be well informed about the content knowledge of water resources and their management, they are not yet able to translate their content knowledge into constructing topic-specific PCK. My study suggests that teachers are not yet rising to the challenge of developing a subtle understanding of EE core concepts for an implementation that promotes activism to prompt changes for sustainable living. The study, therefore, proposes an ideal framework for PCK in EE to enable effective teaching of EE-oriented topics. The model incorporates the categories of teacher professional knowledge bases, Topic Specific

Pedagogical Content Knowledge and beliefs influencing classroom practice. The model also takes into consideration the national goals of EE, as well as the components of teaching and learning of EE, that is: *in*, *about* and *for* the environment.