



Viewpoint

Environmental Education in Teacher Education: A Viewpoint Exploring Options in South Africa

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Abstract

Environmental knowledge is often regarded as difficult to define and position in education in general and in teacher education in particular. This presents challenges for both knowledge production and for curriculum development for teacher education programmes. While many 'traditional' disciplines have well-defined knowledge bases developed over time, environmental education does not, and is also less easy to integrate into teacher education programmes.

In this paper, the policy framework for teacher education in South Africa is explored so as to develop ideas for knowledge selection and inclusion in environmental education for professional (teacher) education in South Africa. The works of Short (2002) on mission/practical knowledge and of Ball, Sleep, Boerst and Bass (2009) on high-leverage practices in teacher education curricula are used as ways of doing in order to enable environmental education. It is contended that these processes can provide ideas to exploit the generative spaces that exist in national policy for inclusion of contextualised, issue-based knowledge for curriculum organisation and of practice-based processes in order that environmental issues and sustainability goals may be included in teacher education curricula in South Africa.

Introduction

South Africa has made progress, in both the policy and practice spheres of education, in including environmental issues in formal education curricula. The right to a healthy environment has been enshrined in the South African Constitution through the Bill of Rights, and directives for including environmental issues in formal education have been made in the *White Paper on Education and Training* (1995) as well as in the various curriculum iterations for schooling that have followed in its footsteps since 1997. This has had implications for teacher education, training and provision. The means by which educators achieve the goal of teaching learners about the environment and environmental issues are as important as the curriculum provisions themselves and have implications for pre-service and in-service teacher education.

In 1991, Fien noted that, if environmental education were to be one of the social agencies through which the transformation to an ecologically sustainable society is to be achieved, the role of teachers as change agents is vital. Tuncer, Tekkaya, Sungur, Cakiroglu, Ertepinar and Kaplowitz (2009) argued that teachers can play an important role in advancing the

environmental literacy of future generations. Insufficient teacher preparation has been identified as one factor weakening environmental education efforts (Knapp, 2000). Cutter-McKenzie and Smith (2003) emphasised that adequate environmental education preparation of student teachers is essential for helping future teachers to implement effective environmental education. While the South African school curriculum policy does require the inclusion of the study of environmental topics in subjects like Physical Sciences, Life Sciences, Geography and Life Orientation, our teacher education policies do not, however, make explicit reference to environmental education.

In this paper, broad practices relating to environmental education in teacher education and the policy documents for Teacher Education Qualifications in South Africa, in particular the Minimum Requirements for Teacher Education Qualifications (MRTEQ), are reviewed with the aim of developing ideas and practices that could support the inclusion of environmental education in teacher education programmes. The constructs related to 'mission/practical knowledge' (Short, 2002) and 'high-leverage practices' developed by Ball *et al.*, (2009) are also explored as possible ways for environmental education to become a reality in teacher education programmes. Thereafter, possibilities for more inclusive practices for environmental education in teacher education in general, and particularly in the South African policy context, are highlighted.

Environmental Education and Teacher Education: A Brief Review of Practices

Various projects have been launched in South Africa to support environmental education implementation in schools in terms of the national curriculum for schools. The National Environmental Education Programme supported by the Danish Government was one of the first, while Fundisa for Change is a current initiative involving multiple institutional partners. Rosenberg (2009) developed a teacher education workbook linked to the national curriculum which saw widespread application in institutions both in South Africa and elsewhere in southern Africa.

While there have clearly been attempts to include environmental education and research ideas related to environmental education in teacher education, a number of studies from around the world suggest that environmental education is not easy to fit into general teacher education programmes.

Moore (2005) described 'barriers' encountered in British Columbia's attempts at implementing education for sustainable development (ESD) in teacher education. These included the problems of disciplinarity, the competitive environment of the university, misdirected criteria for evaluating students, and the setting of multiple priorities by the administration. The problem of disciplinarity relates to ESD and environmental issues being hard to give a 'home' in the traditional disciplines in university curricula and programmes and seems to be a significant impediment for environmental education and ESD.

Gough (2009) asserted that, while there have been calls and attempts to include environmental education in teacher education since the late 1980s, there is an almost universal lack of success in introducing consistent environmental education programmes in teacher

programmes. Although many of these programmes focused on increasing awareness about environmental issues and on the environmental content knowledge of pre-service teachers, few were concerned with pedagogy, a need for changing world views, or improving the expertise of the teacher educators (Gough, 2009).

Ormond, Zandvliet, McLaren, Robertson, Leddy and Metcalfe (2014) studied the inclusion of environmental education in Canadian institutions offering teacher education. They concluded that, while many programmes were attempted, 'including and supporting teacher candidates to develop the knowledge, skills and strategies and courage to enact change in schools through progressive practices related to environmental learning and experiential pedagogies is an ongoing challenge for teacher education' (Ormond *et al.*, 2014:176). They also found that, when trying to reconceptualise the dominant (hegemonic) approach to teacher education, many difficulties were experienced, difficulties that were related to policy imperatives.

Van Petegem, Blicck and De Pauw (2007) described attempts to include environmental education in two teacher education colleges in Belgium. Environmental education implementation, they indicated, needed to be prioritised in official policy statements and imperatives, the aim being to enhance future teachers' competencies in teaching and environmental education in their classrooms. The authors viewed environmental education to be action-oriented and interdisciplinary, involving more than one subject area. This, they stated, required collaboration between staff and between different college departments, which was then not current practice. The absence of such collaboration consequently hindered the development of environmental education in the teacher education programmes.

Mosothwane and Ndwapi (2012) surveyed students in Botswana who had been exposed to environmental education in the teacher education programmes that they had attended. A revised national policy on education required colleges of education to train teachers in environmental education using an infusion approach. The authors found, however, that the colleges had not been able to implement the desired programmes successfully, or at all, by the time that their survey was conducted.

McKeown-Ice (2000:10) reviewed the status of environmental education as a component of teacher education programmes in the United States of America. Her data led her to conclude that most of the institutions surveyed were not preparing pre-service teachers to be effective environmental educators. The main reason seemed to be that, generally, environmental education in pre-service teacher education programmes is not institutionalised. Similar findings were made by Gough (2009) regarding Australian institutions.

Yet Gough (2009) and Ormond *et al.* (2014) also referred to studies that indicated that policies may always leave spaces or opportunities for implementation by institutions, at least at the local level. Gough (2009:7) highlighted the UNESCO (United Nations Educational, Scientific and Cultural Organization) guidelines for teacher education (2005) as being a case in point. The Guidelines and Recommendations for Reorienting Teacher Education to Address Sustainability provided space for institutions to develop their own guidelines in order to enable education for sustainable development programmes for teacher education. From this it can be inferred that curriculum policy often offers generative spaces for teacher educators to include environmental education and education for sustainable development in their initial

teacher education programmes. But how are teacher education programmes to be structured and how might adjustments and broadening of programme offerings (through the inclusion of environmental education) be made in terms of programme curriculum organisation in South Africa?

Environmental Education and Teacher Education: Policies and Practices

Pre-service teacher education has parameters generally associated with the accreditation requirements for these programmes (Ormond *et al.*, 2014). Teacher education is linked to qualifications and professional standards for teaching as a profession, and programmes are accordingly governed by policies that operate on various levels.

Grossman and McDonald (2008:192) highlighted three aspects of policy implementation that are particular to the contexts for teacher education. These are: (1) national and state policies, (2) institutional contexts, and (3) local districts and labour markets. At national or state levels, standards and requirements for accreditation are determined and these dictate the contours of teacher education programmes. According to Grossman and McDonald (2008), the institutional context plays a significant role in the implementation of teacher education programmes by enabling and constraining different aspects of the programmes and the work of teacher education. While the structure of programmes is determined by regulatory bodies, (tertiary) teacher education institutions can be as innovative and flexible as they wish, as long as their programmes are fully compatible with national guidelines. It is often left to individual institutions to determine how much emphasis is to be given to environmental or sustainability education (Ormond *et al.*, 2014).

Teacher education in South Africa is governed by the MRTEQ as developed by the Department of Higher Education and Training (DHET, 2011). These minimum requirements deal with the design and development of qualifications for teachers and other professionals working in education in schooling and other environments. The policy was developed to align teacher education policy with the National Qualifications Framework introduced in 2008 and with the Higher Education Qualifications Framework.

This MRTEQ foregrounds knowledge and describes teachers as ‘knowledge professionals’. Knowledge is seen as active knowledge, as opposed to inert knowledge, and is linked to knowledge of the *what*, *how* and *why* in moments of practice (Green, 2012). This policy specifies a knowledge mix (DHET, 2011) related to the purpose of the qualification in which the organising ‘umbrella’ concept is knowledge-positioned actively as learning. This mix (see Table 1) includes:

- Disciplinary learning, i.e. academic disciplines and the foundations of learning;
- Pedagogical learning, i.e. general and specific pedagogies related to the discipline;
- Practical learning, i.e. learning in and from practice;
- Fundamental learning, i.e. language competence, information and computer technology, and academic literacies; and
- Situational learning, i.e. learning encompassing self, situations, contexts and environments.

Table 1. A knowledge mix for teacher education programmes (South Africa)

Integrated and Applied Knowledge				
Disciplinary learning	Pedagogical learning	Practical learning	Fundamental learning	Situational learning

Adapted from: DHET (2011), MRTEQ Appendix C, p. 15.

In terms of this policy, teacher education programmes need to prepare teachers as subject specialists in at least two school subjects (disciplinary learning) and to cover competencies and understandings in all the subsections of the knowledge mix in Table 1. Phase specialisms and the competencies and roles of teachers are also stipulated in the document.

Ball *et al.* (2009) suggested that teacher education programmes are largely based on subject matter or content teaching, and on ways of teaching the content. These are the two main determinants for developing a teacher education curriculum. This makes the task difficult for environmental education, given the nature and structure of environmental education ‘knowledge’. It is our view, however, that the knowledge domains of practical learning (learning in and from practice) and situational learning (understanding contexts and environment) in Table 1 can provide space for teacher education programmes to include environmental education understandings, knowledges and practices in South Africa.

Next, we turn to exploring what constitutes environmental education practices and knowledge(s).

Environmental Education Practices, Knowledge and Processes

Environmental education content does not fit neatly into a disciplinary knowledge organisation. The subject boundaries are not easily defined, nor are the knowledge bases as clearly presented as in traditional school subjects such as Life Sciences or Geography, or course modules at post-school levels. Lee and Williams (2001:223) described environmental education as a broad-based area of study that does not have defined disciplinary boundaries. They argued that environmental education should be holistic and proposed that:

- Environmental education is not a subject in itself, but a function of education with content drawn from the whole of the school curriculum;
- Investigation of issues is important and should range from local to regional, national and global scales;
- Integration of education about, in and for the environment is required; and
- Environmental education should encompass the development of environmental awareness, knowledge, values, responsibility and action.

Corney and Reid (2007:34) expressed similar views on the content of environmental education or education for sustainable development. The subject matter, they stated, is complex: it typically focuses on interrelationships between environmental, economic and social factors, is value-laden, and the terms used are open to different interpretations. The spheres of sustainability, environment, society (including culture) and economy must be considered (Corney & Reid,

2007:35), and can be studied at scales varying from local to global. The subject matter is furthermore constantly evolving, always remaining provisional and somewhat undefined, unlike most other subject matter and disciplinary knowledges, and thus creates a sense of uncertainty among learners and educators alike.

How might teacher education respond to the associated challenges of subject matter and pedagogy in order to make environmental education meaningful in education settings? And how might this be done in a manner which fits both the policy as well as practices of curriculum development in higher education? In the next section, we draw on the work of Short (2002) on mission and practical knowledge, which provides a framework or heuristic to discuss the possibilities for environmental education knowledge inclusion in the teacher education curriculum. We also draw on ideas from Ball *et al.* (2009) related to practices, and improvement of practices, for framing environmental education inclusion in initial teacher education in South Africa.

Practical Knowledge as an Educative Process for Environmental Education in Teacher Education

Subject matter or content knowledge for school subjects or for courses of study at other levels is derived from traditional disciplines that have developed as knowledge repositories over time (Short, 2002). Subject disciplines have enquiry and research histories which have developed knowledge bases through the decades, and research methods defined for the discipline are 'employed' to develop data which adds to the knowledge base of the discipline. School subjects are derived from the disciplines and knowledge bases developed by way of a downward design where particular knowledge 'fragments' are packaged in particular ways to develop the curriculum (Short, 2002). These would include ideas related to continuity and to progression from what are considered to be less cognitively demanding conceptual understandings to more advanced understandings, which are then formally presented as a curriculum.

Short (2002) developed conceptual distinctions for thinking about how best to organise the curriculum in universities and other higher-education institutions. He indicated that all universities have an educative function of providing opportunities for general and specific professional and vocational education. He argued that universities and agencies contribute to the repository of knowledge over time by way of disciplines. Disciplines, he stated have particular methods and ways of doing that lead to the production of knowledge. Conventionally, knowledge is generated by way of particular modes of enquiry and methods that suit the practices and questions common to the discipline. Teaching and research expertise influence courses offered rather than rational statements of curricular intent or purpose (Short, 2002).

Short (2002) developed the idea of *practical or mission* knowledge as another form of knowledge that can be developed in universities as an alternative, more flexible approach to knowledge production than disciplinary knowledge. Practical or mission-oriented knowledges are associated with human activities such as education, maintaining health, or

the construction of bridges and buildings. Practical knowledge is generated when a need arises in situations where such human activities pose questions that must be answered in order for successful action to be taken. These needs and questions arise in particular contexts, thus rendering general disciplinary knowledge alone inappropriate for dealing with such needs and questions. Short (2002) also argued that the practical intent of mission-oriented questions presupposes that questions that are generated in particular contexts need to be formulated and answered in ways commensurable with such contexts.

This kind of knowledge may be interdisciplinary, as it results from enquiry into questions that cannot be analysed or broken down into easily researchable parts. It is therefore not an answer to an intellectual question but to localised and contextualised questions and issues. So, practical knowledge comes into play in practical human activities, where it is used judiciously and appropriately in conjunction with other knowledge (from disciplines) in order to act in real situations considered relevant to the task of learning to act as a citizen or human being. The content is structured around facets of the actual tasks of a human being or citizen and draws on knowledge from disciplines that inform decisions of practice. It is appropriately selected and organised knowledge to fulfil educative functions in contexts.

Practical or mission knowledge seems to fit the more unconventional nature of environmental education content knowledge, as it can include *issues and problems* which occur in context and needs local 'research' or enquiry for knowledge production. Local communities, including students, can be involved in organised research processes focused on local issues and needs. This addresses many of the challenges highlighted earlier in relation to the lack of a disciplinary knowledge base for environmental education and to the fragmented, provisional and tentative nature of knowledge for environmental education.

What sort of competencies and skills would teachers need to enact pedagogies for such approaches to environmental education?

Environmental Teaching: Developing 'High-leverage Practices' for Environmental Education

It is contended that the MRTEQ document (DHET, 2011) further provides 'space' that can be used generatively to include environmental education practices and approaches in the teacher education curriculum in South Africa. In the recommended knowledge mix, the category of practical learning (learning from teaching) allows for the inclusion of varying approaches to, and reflection on and in, practice. This provides teachers with opportunities for what Ball *et al.* (2009) referred to as learning in context and through practice. Learning in and from practice is a space that allows for emergent pedagogies from situational issues and problems (as discussed by Short, 2002) to be practised in classroom situations.

Ball *et al.* (2009:460) developed a process for articulating the work of teaching mathematics, which can be regarded as being applicable to environmental education processes as well. They considered the development of a curriculum for teaching practice an important aspect of developing and scaffolding particular practices, especially for novice or pre-service teachers. They suggested the identification of core task domains of

teaching, namely: planning, choosing and using representations, engaging in discussions of (mathematics) problems, and then analysing and ‘*decomposing*’ these domains into teachable components. Grossman and Shahan (2005) described ‘decomposition’ of practice as the process of breaking it into smaller practices, with aspects that can be identified, studied, taught and rehearsed and then reintegrated into the actual work of teaching.

Ball *et al.* (2009:460) also referred to the identification and implementation of *high-leverage practices*, that is, practices in which the proficient enactment by a teacher is likely to lead to comparatively larger advances in student learning. They noted that choices must be made as to which aspects of teaching to emphasise over others during teacher education, and that, in making these choices, practices must be sought which will teach students the fundamental elements of professional work that are unlikely to be learnt on one’s own through experience. We would argue that, in environmental education, these practices would be the issue-based approaches to local problems, discussions, debates and investigations that Corney and Reid (2007) described as suitable pedagogies for environmental education. It is therefore proposed that these practices be foregrounded in student teachers’ practice learning and that they continually be reflected on and further developed as ‘high-leverage practices’. In this way, practices that promote environmental education topics and ideas can be foregrounded and learnt by pre-service teachers, thus becoming integral to teacher education programmes.

Concluding Comments

Fien (1991) indicated that the attitudes and skills of teachers are central in determining the mix of different types of knowledge, skills and affective objectives in environmental education programmes. This paper has provided a viewpoint on how these attitudes and skills can be developed in environmental education programmes in education institutions.

Latta and Field (2005) suggested that teacher education needs to expand from the current ideas related to representative certainty and singularity in ways of seeing and doing in classrooms. Programmes need to develop capacity for relational thinking connected to the relational complexities of teaching in teacher education. This is similar to the ideas of Gore, Griffiths and Ladwig (2004:375) who called for a reassessment of teacher education priorities in order to focus more on the substance and purpose of teaching and include intellectual quality, relevance, social support and recognition of difference, an approach they referred to as ‘productive pedagogies’.

The approaches related to the development of localised (practical) knowledge (Short, 2002) and to ideas for a teaching practice curriculum that supports high-leverage practices (as developed by Ball *et al.*, 2009) could be used to enable environmental knowledge and pedagogical competencies that currently seem absent from teacher education programmes. These ideas are suited to filling the generative spaces provided by the knowledge mix in the MRTEQ, namely situational learning and pedagogical learning. They could go a long way to making environmental education a reality in teacher education in South Africa and possibly other contexts as well.

Notes on the Contributor

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References

- Ball, D., Sleep, L., Boerst, T. & Bass, H. (2009). Combining the development of practice and the practice of development in teacher education. *The Elementary School Journal*, 9(105), 458–474.
- Corney, G. & Reid, A. (2007). Student teachers' learning about subject matter and pedagogy in education for sustainable development. *Environmental Education Research*, 13(1), 33–54.
- Cutter-McKenzie, A. & Smith, R. (2003). Ecological literacy: The missing paradigm in environmental education. (Part one). *Environmental Education Research*, 9(4), 497–524.
- DHET (Department of Higher Education and Training). (2011). National Qualifications Framework, Act 67 of 2008. Policy on the Minimum Requirements for Teacher Education Qualification. Pretoria: Government Gazette No. 34467.
- Fien, J. (1991). Accepting the dual challenge for professional development in environmental education. *International Journal of Environmental Education and Information*, 10(1), 1–17.
- Fien, J. & McLean, R. (2000). Teacher education for sustainability. II. Two teacher education projects from Asia and the Pacific. *Journal of Science Education and Technology*, 9(1).
- Gore, J., Griffiths, T. & Ladwig, J. (2004). Towards better teaching: Productive pedagogy as a framework for teacher education. *Teaching and Teacher Education*, 20, 375–387.
- Gough, A. (2009). Not for want of trying: Strategies for re-orientating teacher education for education for sustainable development (ESD). Keynote address made at the 12th UNESCO–APEID International Conference, Bangkok, Thailand, 24–26 March 2009.
- Green, W. (2012). Policy on the Minimum Requirements for Teacher Education Qualifications. Presentation at a Bridge Teachers Upfront seminar, 7 February 2012. <http://www.bridge.org.za/wp-content/uploads/2014/12/Teachers-Upfront-Presentation-W-Green-7-Feb-2012.pdf>, visited 20 November 2017.
- Grossman, P. & McDonald, M. (2008). Back to the future: Directions for research in teaching and teacher education. *American Education Research Journal*, 45(1), 184–205.
- Grossman, P. & Shahan, E. (2005). The anatomy of practice: The use of decomposition. Paper presented at the annual meeting of the American Education Research Association, Montreal.
- Knapp, D. (2000). The Thessaloniki Declaration: A wake-up call for environmental education? *Journal of Environmental Education*, 31, 32–39.
- Latta, M. & Field, J. (2005). Flight from experience to representation: Seeing relational complexity in teacher education. *Teaching and Teacher Education*, 21, 649–660.
- Lee, C. & Williams, M. (2001). Researching environmental education in the school curriculum: An introduction for students and teacher researchers. *International Research in Geographical and Environmental Education*, 10(3), 218–244.

- McKeown-Ice, R. (2000). Environmental education in the United States: A survey of preservice teacher education programs. *The Journal of Environmental Education*, 32(1), 4–11.
- Moore, J. (2005). Barriers and pathways to creating sustainability education programs: Policy, rhetoric and reality. *Environmental Education Research*, 11(5), 537–555.
- Mosothwane, M, & Ndwapi, G. (2012). Training pre-service teachers in environmental education: The case of colleges of education in Botswana. *International Journal of Scientific Research in Education*, 5(1), 26–37.
- Ormond, C., Zandvliet, D., McLaren, M., Robertson, P., Leddy, S. & Metcalfe, S. (2014). Environmental education as teacher education: Melancholic reflections from an emerging community of practice. *Canadian Journal of Environmental Education*, 19.
- Rosenberg, E. (2009). *Teacher education workbook for environment and sustainability education*. Grahamstown: Rhodes University.
- Short, E. (2002). Knowledge and the educative functions of a university: Designing the curriculum of higher education. *Journal of Curriculum Studies*, 14(2), 139–148.
- Tuncer, G., Tekkaya, C., Sungur, S., Cakiroglu, J., Ertepinar, H. & Kaplowitz, M. (2009). Assessing pre-service teachers' environmental literacy in Turkey as a means to develop teacher education programs. *International Journal of Educational Development*, 9(4), 426–436.
- Van Petegem, P., Blicck, A. & De Pauw, J. (2007). Evaluating the implementation process of environmental education in preservice teacher education: Two case studies. *Journal of Environmental Education*, 38(2), 47–54.