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Research Article

Factors bolstering the implementation of environment and sustainability education: A South African case study

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Abstract

Scholars, globally, acknowledge environment and sustainability education (ESE) as a key vehicle towards addressing the myriad of environmental challenges. This paper is premised on empirical evidence which succinctly points to the dearth of literature that focuses on the implementation of ESE in the realm of early childhood education (ECE). The approach adopted for this inquiry is a multiple-embedded case study, underpinned by an interpretivist qualitative research paradigm which focussed on four institutions enlisted for investigation. One-on-one interviews, participant observations and document analysis were used for data generation while thematic and domain analyses were used for data interpretation. The findings of this inquiry suggest that there are numerous factors that support the teaching of ESE. The researcher asserts that the findings highlighted in this paper corroborate those of numerous studies conducted elsewhere in the world. However, based on the findings, the researcher also notes and can thus conclusively aver that there is a dearth of research that focuses on enablers of ESE. Furthermore, the researcher recommends that more research be conduct which focuses on the investigation of the factors that support the environment-inclined pedagogy.

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Introduction

The first Intergovernmental Conference on Environmental Education held in Tbilisi (Georgia, USSR) in 1977 adopted a declaration which included, inter alia, the guiding principles of Environmental Education (UNESCO 1978). One of the key propositions advanced by these principles is the notion that Environmental Education (EE) should be a lifelong process that cuts across all stages of human development and education levels. Indeed, this call for sustained and impactful environment-inclined education, which was made for the first time by the UN Conference on the Environment of 1972 held in Stockholm, has been heeded by various counties across the globe. Nevertheless, the state of the environment has continued to decline. Globally, there is a myriad of environmental challenges, these include climate change, pollution, excess waste production, population explosion, a decline in biodiversity, water shortage and etcetera (Casinader 2021; Sagala, Nuangchalerm, Saregar & El Islami, 2019). For this reason, various environment–inclined efforts have been undertaken in many countries and various environment–inclined conferences and meetings also called for impactful action towards addressing environmental challenges (Sikhosana, Mudau and Msezane 2020; Mandikonza and Lotz-Sisitka, 2016).

Over the past few years, studies have been conducted which demonstrate that, to some degree, EE is being implemented at certain primary and secondary schools in various countries around the globe (Green and Somerville, 2015). For example, in Southern Africa, just like in other parts of the world, studies have been conducted which

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focused on the implementation of EE (Mathenjwa 2014; Mokhele 2011; Motshegoa 2006). Also, in the same region, numerous empirical investigations have highlighted barriers that impede the teaching of EE (Mwendwa 2017; Velempini 2016; Joseph 2014; Kanyimba, Hamunyela & Kasanda 2014; Agnes & Nor 2011). These studies have focused on older children and adults such as teachers.

Contrariwise, literature also indicates that the realm of early childhood education (ECE) has experienced a very slow and intangible uptake of EE (Sawitri 2017). The snail pace in the uptake of EE in ECE can be attributed, at least in part, to the virtual absence of research that focuses on EE in this vital field of education. Accordingly, to underscore the lamentable dearth of research of EE in ECE, Davis (2009) uses the phrase '*gaping research hole'* as a metonym for this shortcoming. Recent research supports Davis's (2009) findings that EE in ECE is neglected and, that more research is needed in this area (Sawitri 2017). This is essential because researchers have little idea concerning what works or does not work in enabling the advancement of EE in ECE. The selective implementation and non-implementation of EE is, without doubt, not helpful as the conditions of the environment continues to deteriorate.

The on-going decline of the environment could be attributed to the fact that for many years, worldwide, there has been sustained focus on and the application of education *about* and education *in* the environment (Agnes & Nor 2011) rather than on education *for* the environment. Various studies distinguish between the 'triumvirate approach' to environmental education, namely education *about* the environment, education *in* the environment and education *for* the environment (Kopelke, 2012; Palmer 1998; Lucas, 1972). Education *about* the environment focuses on equipping learners with knowledge and facts about, *inter alia*, what the environment entails, how it works and the challenges of the environment while education *in* the environment provides learners with opportunities to interact with the environment, for example, by interacting with various fauna and flora in the outdoors. Arguably, both education *about* and *in* the environment are less advanced forms of environmental education. Thus, the continued decline in the state of the environment accounts for the greater focus on these two forms of environmental education with minimal attention given to 'advanced' environmental education.

In its 'advanced' form, environmental education manifests as education *for* the environment (Kopelke 2012; Le Grange, 2002). Education *for* the environment has been 'rebadged' by some scholars as education for sustainable development (Robottom, 2007) or environment and sustainability education (ESE). This form of environmental education empowers the learner to actively participate in bringing about social change *for* the betterment of the environment. Education for sustainable environment is characterised by, among other characteristics, pro–environment activism emanating from advanced awareness of the challenges affecting the environment, positive attitudes towards the environment and application of skills acquired, over time, to advocate for the well-being of the environment. Therefore, in its advanced form, environmental education enables individuals and groups to work towards ameliorating the negative impact that human beings have on the environment by fostering and promoting environmental sustainability for future generations and the well–being of all components of the environment. Furthermore, ESE is transformative, dynamic, all–inclusive, accommodates diversity of opinion and knowledge and, it advocates for justice and social change (Tilbury, 2004). In its content and form, the agenda advanced through Sustainable Development Goals (SDGs) is in line with education *for* the environment (Ferguson, 2020; Sikhosana, Mudau and Msezane 2020). Accordingly, in this article the concept ESE is preferred as it acknowledges 'real' environmental education in the form of education *for* the environment.

Previous work

The literature reviewed in preparation of this paper suggests that there are numerous factors that could be considered as enablers of EE. These factors could be classified into the following main categories, namely, an enabling curriculum framework, teachers' training background and teaching experience, leadership and support, cooperation, and collegiality, and learning and teaching support materials (LTSM).

Even though it is the view of this researcher that each of the enablers discussed in this paper is as important as any other, an enabling curriculum framework seems to be more important. By its nature, the curriculum framework is cardinal in providing guidance to the teacher within the realm of pedagogy. It is the blueprint that carries the mandate and guidelines on what the teacher is expected to do in the classroom situation (Kuzich et al. 2015). Research suggests that, in the main, the schools that incorporate EE in pedagogy, across the world, do so based on tangible investments made by governments in shaping curricula in the way that directs the schools, implicitly and/or explicitly, on the importance of EE in pedagogy (Kuzich et al. 2015; Evans et al. 2012). Likewise, school subject policies that are, ordinarily, crafted in line with the school curriculum also serve to enable EE in pedagogy (Joseph 2014; Gajus-

Lankamer, 2004). Therefore, the nexus between the school curriculum and the various school subjects offered in a school enhances the possibility of EE implementation.

In addition to an enabling curriculum, literature also points to the importance of teacher training background and teaching experience in enhancing the possibility of EE implementation. Gajus-Lankamer (2004) argues that for teachers to be able to implement EE, they need to be trained and prepared for this role. The extent of teacher education and preparedness should be discernible from, inter alia, expertise in sustainability issues, pedagogical competencies and innovative strategies employed in the practical integration of EE in pedagogy (Kuzich et al. 2015; Joseph 2014; Evans et al. 2012; Walshaw 2012). Incontrovertibly, the realisation of preceding ideals hinges on, inter alia, '*appropriate*' teacher training and teaching experience accumulated by the teacher, over time, in the field of teaching.

An on-going in-service professional leadership and support provided, both from within and beyond the school setting, is considered one among various elements that serve to complement the pre-service training and teaching experience of individual teachers in enabling EE implementation. Literature suggests that within the school setting, the leadership and support provided by the principal and co-managers plays a vital role in enabling EE. Likewise, from 'outside' the school, government authorities, particularly, education departments also play an important role in providing leadership and support to assist teachers in the implementation of EE. Evans et al. (2012) point out that school principals and government authorities play various cardinal roles in empowering and supporting teachers in their quest to advance effective implementation of EE in Australia. For example, in Australia, both the federal and state governments are credited for offering, inter alia, grant schemes while school managers see to the provision of expert needs of teachers regarding sustainability education (Evans et al. 2012). Joseph (2014) also noted that in Namibia, government authorities play a critical role in facilitating the implementation of EE by, for example, presenting in-service workshops to empower teachers.

The importance of cooperation and formation of partnerships among teachers as well as between teachers and community organisations is another important enabler of EE (Hart, 2006). For example, in their research with a focus on the inclusion of education for sustainability in selected schools in Australia, Green and Somerville (2015) observed that to expand their knowledge of sustainability, teachers often reach out to the broader neighbourhood by collaborating with various stakeholders such as parents, civic organisations, businesspeople, local government and environment preservation groups. Likewise, Kuzich et al. (2015) also noted, in their research conducted in Australia, that EE-inclined programmes were initiated and structured in a way that enables collaboration between schools and communities in areas such the supply of teaching resources, staff training and reporting on the results of sustainable education programmes. Equally, Joseph (2014) points to the importance of collegiality and support among teachers in enabling EE in the classroom. Accordingly, Joseph (2014) asserts that her study participants indicated that teachers supported one another in a quest to integrate environment-based pedagogy in their schools.

The selection and/or designing of 'appropriate' learning and teaching support materials (LTSM) are other elements that are considered key enablers in the implementation of EE (Kassabolat et al. 2020). There are various forms of LTSM that can be used to support EE in pedagogy. These include, inter alia, textbooks and workbooks that are designed with environmental issues in mind (Joseph 2014) and, an enabling infrastructure (Kuzich et al. 2015). Kuzich et al. (2015: 187) assert that the schools that implement EE effectively have physical infrastructure that is "purposely created to support EfS". Typically, to enable action-based environmental learning (Fisher-Maltese, 2016), these schools would have features such as vegetable grounds, water recycling systems and used water stratagems in place (Kuzich et al. 2015).

Problem of the Study

As indicated in the preceding paragraphs, empirical evidence suggests that there is exiguous and narrow implementation of ESE in primary and secondary schools and the scarcity of ESE research in ECE is acknowledged. Apart from the dearth of ESE research in ECE, literature also suggests that there are several barriers that impede the implementation of ESE (Anderson and Jacobson 2018; Lasen et al. 2017), not only in ECE but, across various levels of education universally. However, on the opposite side of the scale, based on the literature reviewed for this paper, there seems to be a paucity of research that focuses on the factors that facilitate the implementation of ESE across various levels of education, particularly in ECE. Accordingly, this paper seeks to answer the question: What are the factors that enable teachers to implement ESE in the realm of ECE?

In an attempt to answer the preceding question, a research project was conducted to investigate the teaching of ESE in ECE. This paper therefore seeks to address the following objectives, namely, to provide an outline of factors, based on empirical research conducted, that can be considered as drivers of ESE and to draw a link, if any exists,

between these factors that enable ESE and literature. Arguably, an attempt to answer the above question should help to uncover the enablers of, obstacles to and prospects of education for sustainable environment in the realm of early childhood education (Davis, 2009). This process is essential as it serves to enhance the prospects of ESE pedagogy.

Method

Research Model

This research is located within a broader context of a doctoral project conducted by the researcher to investigate the implementation of EE in selected Grade R (known elsewhere as kindergarten or the preschool class) centres in one geographical region of the North West Province of South Africa. The interpretive qualitative paradigm, which aids a researcher to obtain a deeper understanding and varied perspectives on phenomena under investigation (Dean, 2018), was used in this research. To facilitate the generation of rich context-based information that is reflective of the 'real' life world of respondents (Thanh and Thanh 2015), the multi-embedded case study design (Yin, 2006) was identified as an appropriate vehicle for this inquiry.

Participants

Maximum variation, an element of purposive sampling strategy (McMillan and Schumacher, 1997), was used in the selection of cases for this inquiry. This approach helps the researcher to access an extensive variety of deviations, forms, and views on the subject under inquiry. The researcher used a set of predetermined criteria (Patton, 1990), as informed by the demographics of the geographical location of this investigation, to identify the four grade R centres, which took part in this inquiry. From each institution, one grade R teacher was chosen to voluntarily partake in the investigation.

The four research sites were selected from the grade R centres that fell under the jurisdiction of the Maquassi Hills Education Area Office, a component of the Dr. Kenneth Kaunda education district. This is one of the four education districts of the Northwest Province of South Africa. For ethical reasons, and in line with the wishes of participants, pseudonyms are used to refer to each of the cases in this research. Site A was a grade R centre attached to a rural primary school while Site C was attached to a township (a settlement designated for African people under the erstwhile laws of segregation) primary school. Both centres used Setswana, one of the eleven official languages of South Africa, for pedagogy. Furthermore, these institutions obtained funding from the provincial government. On the other hand, both Sites B and D, respectively, were based in urban areas. Site B was attached to a comprehensive school, which catered to classes ranging from grade R to grade 12 and used English as the language of pedagogy. Site D was attached to a primary school and used Afrikaans (another official language of South Africa) for instruction. Concerning funding, Site B received no government funding while Site D was partly funded by the government.

In respect of participants, some connections and disparities were also noted. Two of the four respondents (Respondents W and X) did not possess the minimum qualification recognised by the South African National Department of Higher Education (DHET) for teaching purposes. According to the norms and standards that regulate teaching, the diploma in grade R teaching or an equivalent qualification, usually a three-year teaching qualification obtained after the completion of grade 12, is recognised for teaching purposes in South Africa (DHET, 2015). Respondents Y and M, attached to Sites C and D respectively, possessed teaching qualifications recognised by the DHET for teaching purposes. Likewise, these respondents had accumulated more teaching experience compared to both Respondents W and X. As illustrated in the findings of this inquiry, some of these demographic details have a bearing on the implementation of EE. The preceding demographics are summarised in Table 1.

Table 1.

Respondents' Profiles

Participant	Grade R Centre	Teaching Qualifications	Age	Grade R and/or other teaching experience
Respondent W	Site A	Grade 12	< 30yrs	4 years
Respondent X	Site B	ECD[1] Level 4	41 – 50yrs	2 years
Respondent Y	Site C	PTC; SED; HED	51 – 60yrs	36 years
Respondent M	Site D	PTD and HED	51 – 60yrs	36 years

*The following is a brief explanation of the acronyms referring to various teaching qualifications as used in table 1, above: ECD Level 4 is a one-year post-Grade 12 Early Childhood Development certificate; PTC = a two-year post-Grade 12 Primary Teachers' Certificate; PTD = is a three-year post-Grade 12 Primary Teachers' Diploma; SED = a three-year post-Grade 12 Secondary Education Diploma; HED = is a one-year Higher Education Diploma awarded to someone who would have obtained a three-year post-Grade 12 qualification before enrolling for such a teaching qualification.

It needs to be noted that to enhance the findings the principals of the four institutions selected for this research were also interviewed. However, since they were not central to the inquiry, their profiles were not requested. The following pseudonyms are used to refer to the principals, namely, Respondent J (Site A), Respondent K (Site B), Respondent L (Site C) while Respondent M doubled as a grade R teacher and principal of Site D.

Data Collection

In this inquiry, participant observations, semi-structured one-on-one interviews, and document analysis were used for data collection. Guided by an observation protocol, the researcher recorded the pedagogical processes that took place in respective classroom contexts. Due to field dynamics, the observation period varied from centre to centre, and it ranged from three to five full days per institution.

After the completion of observations, one-on-one interviews were conducted with each of the grade R teachers and school principals. With permission from each respondent, the interviews were audio-recorded. These interviews were conducted at the convenience of participants, and each respondent had the latitude to be interviewed in their preferred languages. Additionally, to enhance the richness of data, numerous documents (lesson plans, LTSM, learner-activity books) were requested from each of the four grade R teachers and analysed.

Data Analysis

Data analysis was done thematically through text reduction (Attride–Stirling, 2001), coding, categorisation and noting of various themes or patterns (Alhojailan, 2012). The nexus between the themes was determined through constant comparison (Leech and Onwuegbuzie, 2007) as the analysis unfolded. However, some of the data collected during observations and analysis of documents could not be analysed in the manner already mentioned, and domain analysis (Neuman, 2011) was thus employed to facilitate the 'extraction' of some examples of environmental issues from the pedagogical activities observed and the documents provided by participants.

It is worth noting that the processes mentioned above commenced in the field. Accordingly, the field notes were examined meticulously and organised into meaningful words, phrases, and sentences to ease data analysis. Likewise, there was a process of transcription of all audio-recorded interviews, and the translation of those interviews that were recorded in languages other than English.

Trustworthiness

Data and methodological triangulation alongside an audit trail of raw data, field notes and data analysis procedures were used to ensure three elements of trustworthiness, namely, credibility, dependability, and confirmability of the findings (Creswell, 2012; Daymon and Holloway 2011). To enable the transferability of findings to other settings, the researcher provided a comprehensive and substantive account of research setting and events.

Ethical considerations

Prior to data collection the researcher met and interacted with each respondent to provide them with detailed information on the purpose of this study and to obtain their consent to participate in the study. The participants were assured anonymity and confidentiality and, their identities were concealed, instead; alphabets were used to identify each participant. Furthermore, the participants were assured that they were free to recuse themselves from participation in the study at any stage if they so desired.

Findings

The analysis of data generated through all three strategies used in this inquiry produced the findings that could be summed up into the following main headings, namely, enabling curriculum framework, teachers' training and teaching experience, leadership, support, and collegiality, and learning and teaching support materials (LTSM). It is important to point out that since it is not the intention of this paper to reflect on the evidence that demonstrates the implementation of EE but to highlight the factors that enable EE implementation, the researcher will only take a cursory reflection on such evidence only when he deems it essential to do so. This is done since the evidence drawn from this inquiry, which suggests that participant-teachers did accommodate EE in their respective classes, is extensive and would thus require a 'special' paper dedicated only to it.

An Empowering Curriculum Framework

Evidence generated from this inquiry indicates that the curriculum pursued in all four learning sites enabled the integration of EE in grade R. Among the four sites, three sites (A, C and D) followed the curriculum assessment policy statement (CAPS) of the South African national Department of Basic Education (DBE) while Site B pursued the Accelerated Christian Education (ACE) curriculum designed by ACE ministries (www.aceministries.co.za). It is also important to note that the DBE curriculum has an expressed commitment toward EE. Among its principles,

which are found in all its CAPS documents, it has one that stands out expressing the intent "to produce learners that are able to use science and technology effectively and critically showing responsibility towards the environment and the health of others" (DBE, 2011b: 5).

Based on data produced from this research, both curricula are designed in a way that enables the integration of EE in grade R classrooms. The topics that are accommodated and can be used to facilitate the teaching of EE in grade R include *weather*, *stories,* and *songs* (DBE, 2011a), *water*, *seasons*, *healthy environment*, *animals*, *birds*, *reptiles,* and *other wild animals* (DBE, 2011b). The findings of this investigation indicate that some of these topics were treated either in the presence of the researcher or prior to his visit to the respective schools. Additionally, it is also essential to note that at least two of the school principals who participated in this inquiry, noted that the already-mentioned curricula allow for the integration of EE in grade R. For example, Respondent J of Site A pointed out that EE "*is being integrated in CAPS*". Likewise, Respondent K of Site B suggested that the ACE curriculum does enable the teaching of EE by asserting, "*I think a lot of that is worked in, into our program, through the stories and through the activities…there is some emphasis on Environmental Education.*"

Professional Teacher Training and Teaching Experience

The ability of a teacher to effectively integrate issues of environmental concern in a specific subject depends on the knowledge content of the teacher in that specific subject and on numerous other proficiencies. Competent teachers have deep subject content knowledge, are skilled in the teaching profession, know how various learners learn different subjects, can apply an array of pedagogical strategies (Lupascu et al. 2014; Yilmaz, 2011), and are also able to help learners draw a link between the subject content and lived experiences (Edwards et al. 2016). Some studies also suggest that to a certain degree, there is a positive correlation between effective teaching and teaching experience (Kini and Podolsky, 2016; Rice, 2010). The teaching competencies mentioned above are very important in the learning of EE because environmental learning is best learned experientially. However, this does not suggest that only experienced teachers are effective or that experienced teachers are necessarily effective teachers.

In this inquiry, three Respondents (M, X and Y) demonstrated some level of effectiveness in their teaching by undertaking an in-depth covering of certain topics. For example, each of the three respondents would begin their daily lessons by vigorously and meticulously engaging learners in some reflection on various elements of the day's weather and their effects on humans and surroundings. These engagements, which could be conceived as learning *about* the environment, demonstrated, inter alia, that the learners had developed some level of awareness that, for example, the choices of clothes worn on a specific day depend on weather conditions, strong winds can shake tree branches and etcetera. The contributions made by the learners in these and numerous other lessons in the classrooms of the three Respondents (M, X and Y) seemed to give credence to a point made by McBer (2000: 11) who argues that "in classes run by effective teachers, pupils are clear about what they are doing and why they are doing it". Furthermore, some authors aver that the effectiveness of a teacher in the classroom is predicated on their level and quality of both pre-service and in-service education and training (Metzler and Woessmann 2010; Rowe, 2006) and teaching experience. Accordingly, it can be argued that the apparent effectiveness of the three respondents (M, X and Y) could be credited to their training and teaching experience. Respondents M and Y respectively, had undergone professional teacher training that exceeded the minimum training required for a person to teach kindergarteners, and had more than 36 years of teaching experience at ECE level. By her own admission, which was corroborated by her manager, Respondent X had no training in the teaching of grade R. To mitigate this shortcoming, she attended "*annual conventions with workshops*" (Respondent K) aimed at enhancing pedagogical effectiveness. Also, she relied on on-going support from the principal and senior colleagues within the school.

Leadership, Support and Collegiality

The findings of this inquiry also suggest that collaboration between teachers and the support given to teachers by various stakeholders also contribute towards enabling teacher effectiveness, and by extension, the accommodation of EE in pedagogy. Literature intimates that teachers who collaborate and interact by, inter alia, sharing knowledge, ideas, and experiences on lesson planning, problem-solving, selection and use of LTSM, and observation of colleagues at work tend to be effective in their teaching (Kini and Podolsky, 2016; The New Teacher Project, 2013). Additionally, factors such as support from school-based leaders and office-based (that is, outside the school) education authorities are also considered important in facilitating teacher effectiveness (TNTP 2013; Pretorius, 2010).

In this inquiry, inter-teacher collaboration interspersed with support from other stakeholders seemed to have contributed to classroom effectiveness. This effectiveness observed in pedagogical activities of three respondents (Respondents M, X and Y) includes the integration of environmental issues. With respect to Respondents M and Y, collaboration with colleagues within their respective school settings seems to be one of the reasons for their classroom

effectiveness. The following assertions by the two respondents highlight the collegiality between them and their respective colleagues. During the interview, Respondent M underlined the collegiality between her and her grade R colleague at Site D by stating, *"We do our planning together. It helps a lot because our work is the same. When there are problems in terms of specific children or groups, we discuss them and find solutions together*". Respondent Y amplified this interdependence by stating that as colleagues in Site C "*we do sit and discuss whatever*" needs to be discussed and share ideas, and "*if we don't get any solution we go to the Head of Department*".

As it was the case with Respondent M and her colleague, there was also an indication that Respondent Y does her lesson planning with her three colleagues. Regarding Respondent X, although she had no grade R colleague with whom she could collaborate to enable her to become effective in her teaching, she had support from her seniors. It is also worth noting that on more than one occasion during the visits to the two centres (Sites C and D), the two respondents (Y and M respectively) would be seen sitting down doing their planning with their grade R colleagues just at the end of their class lessons.

Learning and Teaching Support Materials

Kassabolat et al. (2020) highlight the importance of LTSM in promoting and enabling pedagogical competence by asserting that schools must provide teachers with adequate and pliant teaching resources to enhance teaching effectiveness and attainment of lesson objectives. Likewise, Akiri and Ugborugbo (2009) contend that effective teaching depends on copious dynamics, and these include the availability of pedagogy-enabling setup and teaching resources at the disposal of the teacher. Hence, Jones (1998) concurs that to fortify a lesson framework, and thereby, promote effective pedagogy, teachers need pertinent learning and teaching resources. Additionally, an absence of resources that 'fit in' with the lesson plan objectives and activities, should nudge an effective teacher to resort to innovation by augmenting the pedagogical program by either, innovatively, developing new resources or adapting existing ones (Green, 2017; Edwards et al. 2016; Jones, 1998).

Evidence from this investigation suggests that although Respondent X did receive some LTSM designed 'to fit into' her daily lesson plans from curriculum developers (ACE), she also developed some resources such as weather charts to supplement these resources. These resources aided learning *about* the environment. Likewise, to complement the limited pedagogical resources such as learner workbooks and wall charts supplied by the DBE, Respondents M and Y developed most of their teaching resources. These resources included, inter alia, flash cards, wall charts, cartoons, material photocopied from personal or library texts, and etcetera. These resources also contributed towards enabling learning *about* the environment. For example, as part of her LTSM, Respondent Y had some A4-size cards that depicted changes in a tree over the four seasons of the year, which she effectively used in her lessons. She also had a wall chart with the title "*where do I live?*" This chart portrayed the "homes" of various animals, for example, a river for the crocodile, a kennel for a dog, and so on. Likewise, Respondent M also had numerous wall charts, which she used effectively in the classroom. For example, among the resources she developed there was a wall chart, entitled *Night Animals*. This wall chart depicted some night-time creatures that could be found in the immediate environment of the learners. These included, inter alia, an owl, a cat, a bat, a lion and a jackal.

Discussion and Conclusion

This paper was an attempt to contribute towards ameliorating the dearth of literature tilted towards identifying facilitators of EE in pedagogy. The findings of this inquiry corroborate several views ventilated by literature concerning the factors that serve as vehicles of EE. Accordingly, in this inquiry, the following factors were identified as supportive of the implementation of EE within the context of ECE settings that formed part of this inquiry, enabling curricula, professional teachers' training and teaching experience, leadership, support, and collegiality and, the appropriate selection of teaching resources. Furthermore, it could be argued that even though there are numerous barriers to EE, which this paper deliberately overlooks as their exploration was not within the scope of this paper; there are evidently numerous factors, as already indicated, which could be taken advantage of, and strengthened, as they serve to expedite EE pedagogy. Significantly, as highlighted in this study, there is a shortage of literature which focuses on identifying factors that enable EE pedagogy. For this reason, more research is essential in this area.

The literature reviewed for this paper also identified the preceding factors as enablers of EE. For example, literature suggests that those in authority are the ones who shape the curriculum to facilitate (or inhibit) the implementation of EE in pedagogy. In essence, one of the key points raised in literature is that if EE is to be implemented then the curriculum should highlight, explicitly or implicitly, the importance and need to teach EE (Kuzich et al. 2015; Joseph 2014; Evans et al. 2012). Additionally, a well-designed curriculum provides opportunities for teachers to, innovatively,

incorporate science and environmental learning (Masters and Park Rogers, 2018). As presented in the results above, the curricular followed in all the sites referred to in this paper were designed to enable EE-inclined pedagogy.

However, for teachers to be able to integrate EE, they need to be well-trained, competent and experienced. Also, the teachers' subject content knowledge and competence, which hinge mainly on professional training and teaching experience, largely, determine classroom pedagogical effectiveness (Hill and Chin, 2018). Therefore, for teachers to effectively implement EE, they need to be professionally competent, have knowledge of sustainability issues and teaching experience. Evidence from this study suggests that three teachers (Respondents M, X and Y) were able to integrate EE in their classrooms while one teacher (Respondent W) could not do so. This could be attributed to the fact that the three teachers had an edge over Respondent W due to their level of training, work experience and the subject content knowledge, which the latter teacher did not possess. These findings corroborate previous and current research (Maidou et al. 2019; Hill and Chin, 2018), which amplifies the value of professional teachers' training, teaching experience and content knowledge in the integration of EE in pedagogy.

Likewise, the three teachers (Respondents M, X and Y) had support from their colleagues and leaders while Respondent W did not have such support. This could be another reason why, as discerned from classroom observations, the three teachers were more effective and were able to infuse environmental learning in pedagogy while Respondent W had shortcomings in this area. The findings corroborate previous and more recent research. Various studies underscore the importance of providing meaningful institutional leadership and support to teachers and the impetus of collegiality in fostering teacher pedagogical effectiveness, including factoring EE in the classroom (Kassabolat et al. 2020; Kuzich et al. 2015; Joseph, 2014). Likewise, recent studies underscore the significant role played by institutional leadership in supporting efforts aimed at ameliorating environmental challenges (Woo and Kang, 2020).

The findings presented in this paper also suggest that Respondents M, X and Y used a variety of learning and teaching resources to cultivate meaningful and effective learning and teaching, including the incorporation of EE, in their classrooms whereas Respondent W relied only on the meagre resources provided by the department of education. In their quest to incorporate real-life experiences to pedagogy, the three respondents selected and designed 'appropriate' teaching and learning resources. As outlined in the presentation of results from this research above, these resources included an array of media that were used to incorporate environmental learning. Accordingly, these findings just like various literature reports amplify the central role played by the selection and designing of appropriate and relevant learning and teaching resources in enabling EE (Heliawati et al. 2020; Kassabolat et al. 2020; Kuzich et al. 2015).

Limitations of the Study

This research, like numerous other inquiries, had its own limitations. Accordingly, two main limitations can be noted, namely, the limited amount of time spent in the field and the non-participation of education officials from the North West Department of Education (NWDE) in the study. As pointed out earlier in this paper, due to field dynamics, the time spent by the researcher in the field varied from one site to the other and the researcher is of the view that the time spent on the field was inadequate. Hence, the researcher is of the view that it is probable that had he spent more time at each site, a deeper understanding of the factors that could be considered enablers of EE would have been obtained.

The other point worth mentioning is that the researcher had intended to enlist the participation of office-based (that is, education department offices outside of the school terrain) officials of the NWDE in this inquiry, particularly those responsible for providing curriculum support to teachers. However, due to undisclosed reasons, they were unwilling to participate in the inquiry. It was the wish of this researcher to find out from them how the department of education ensures the realisation of the ideals and aims enshrined in curriculum policy documents that point to the commitment of the South African National Department of Education to EE.

Despite the above-mentioned limitations, it is the view of this researcher that the purpose of this investigation was fulfilled. The findings highlighted in this paper affirm this assertion.

Recommendations

Based on the findings mentioned in preceding paragraphs, this researcher would like to underscore the need for more research that focuses on factors that contribute to the implementation of EE, not only within the realm of ECE but across the spectrum of education levels. This need derives from the fact that, as stated earlier in this paper, there is a dearth of literature that seeks to identify the factors that facilitate the implementation of EE. Accordingly, it is the

view of this researcher that to broaden the knowledge of teachers, and all the stakeholders who are interested in the advancement of EE, it is necessary to conduct more research that focuses on enablers of EE. This should be done to help all stakeholders with an interest in education obtain a broader perspective regarding the factors and approaches that work to facilitate the implementation of EE, particularly in ECE and, generally, in other levels of education. Arguably, knowing what works and what does not work would best serve the purpose of strengthening the effectiveness of existing practices that advance EE and circumvent those that derail EE. Thus, it is the view of this researcher that to make inroads towards advancing the implementation of EE, especially in early childhood education, the existing enablers of EE should be put to good use, but more importantly, more enablers of EE need to be 'uncovered'.

Furthermore, since the South African public school curriculum policy framework does not provide explicit guidelines on how EE should be integrated in teaching, policy developers need to enhance the curriculum by incorporating tangible guidelines on how environmental learning should be accommodated and advanced in pedagogy. Accordingly, it is the considered view of this researcher that some of the enabling factors underscored in this paper could be tailored to help in the crafting of environment-oriented curriculum directives. Arguably, this approach could be adopted by countries globally where environment and sustainability inclined pedagogy is disenfranchised.

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