

## Research Article

# Insights into the integration of environmental education in the senior phase

Lettah Sikhosana<sup>1</sup>, Awelani V Mudau<sup>2\*</sup>, Sikhulile Bonginkosi Msezane<sup>3</sup>

Department of Science and Technology Education, University of South Africa, South Africa

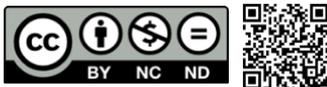
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### Abstract

The aim of this paper was to explore how and why senior phase teachers are capable or incapable of integrating environmental education in teaching and learning process. From anecdotal evidence during the work integrated learning process, it was observed that teachers do not necessarily integrate environmental education, and this became the purpose of the study to find out why they do not. Consequently, a research method used was qualitative interpretative multiple case study design in one of the districts of the Mpumalanga province in South Africa. We selected three teachers who separately teach life orientation, natural sciences, and technology in grade 7 as participants from the schools. Data collection tools were interviews and observations. Teachers were interviewed in their schools and some of their lessons were observed. Data was analysed using a typology approach. We inferred from the results and findings of the paper that these teachers had problems with the integration of environmental education. The problems ranged from the lack of understanding of what is environmental education to misconceptions of the concepts of environment and environmental education. With these challenges it is not surprising that even the ones that could integrate were not aware that they did integrate environmental education. It is therefore suggested that it was not a lost cause at all as they had glimpses of how to integrate environmental education which argues well for the recommendation that the micro foundation of in-service interventions to capacitate teachers on how to integrate environmental education across all the subjects should be done. Further studies are recommended on the effectiveness of the in-service workshops that focuses on the integration of environmental education.

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## Introduction

“The 2030 Agenda and the Sustainable Development Goals are our collective response to building a fair globalization” (United Nations [UN], 2019:17), this was said by António Guterres, the United Nations Secretary-General. He mentioned this during the meeting of head of states and governments that were gathered at the United Nations summit to discuss and review the progress of the implementation of the 2030 Agenda for Sustainable Development and the 17 Sustainable Development Goals. These discussions reinforced the fact that deliberations on the sustainability of our planet are on-going and are of a serious nature on a macro level. Furthermore, it is important to acknowledge that environmental education has a huge potential for transforming and rethinking education in a manner that changes human lives towards sustainability (United Nations Educational Scientific Cultural Organisations [UNESCO], 2018).

The world on its own is embedded with various environmental issues that are harmful such as pollution, deforestation, natural disasters, climate change, loss of biodiversity and overpopulation (Zaini & Ita, 2020). These environmental issues led to the formation of World Environmental Education Day, whereby schools, environmental education centres and public institutions gather together in order to develop educational actions to shape transversal

<sup>1</sup> Doctor of Philosophy in Environmental Education Student, Department of Science and Technology Education, College of Education, University of South Africa, E-mail: [lettahsikhosana@gmail.com](mailto:lettahsikhosana@gmail.com), Orcid No: 0000-0003-4406-7795

<sup>2</sup> \*Corresponding Author: Full Professor, Department of Science and Technology Education, College of Education, University of South Africa. E-mail: [mudauav@unisa.ac.za](mailto:mudauav@unisa.ac.za), Orcid no: 0000-0002-0827-5688

<sup>3</sup> Lecturer, Department of Adult Basic Education and Training, College of Education, University of South Africa. E-mail: [msezab@unisa.ac.za](mailto:msezab@unisa.ac.za), Orcid no: 0000-0002-0608-8301

skills and to make people characters of change by being more environmentally friendly (World Environmental Education Congress, 2018). Therefore, solutions to these environmental issues can be achieved through acquiring adequate knowledge about environmental education (Makokotlela, 2016). Hence, it is important to raise awareness about environmental issues since environmental education is already a part of the school curriculum and is integrated across all subjects. It is also important to ensure that the effectiveness of determining environmental education initiatives is taken into consideration, especially in South Africa (Makokotlela, 2016).

From anecdotal evidence during the work integrated learning process the first author observed that teachers do not necessarily integrate environmental education or even if they attempt to integrate it, it raised questions to the first author. This is so because there was no real plan of what the integration aims to achieve. For example, the teaching of pollution would not necessarily address environmental issues within the vicinity of the learners but rather to achieve the aim of the main subject matter of a particular subject.

### Empirical Studies

Authors like Zaini and Ita (2020) did raise issues pertaining to the lack of knowledge from teachers on what environmental education entails. It follows then that what was observed could not be fallacy but a matter that needs serious intervention if we want to achieve the 2030 sustainable development goals of the United Nations related to the environmental issues. But one cannot just start by designing an intervention strategy without first zooming on what teachers do when they say they are integrating environmental education.

Authors like Velepini (2017) focused on the impact and the integration of environmental education in the secondary school curriculum. While McCrea (2006) focused on the roots of environmental education, taking into consideration how the past supports the future since the roots of environmental education are diverse and extremely broad. In this paper we focused on finding out how senior phase teachers integrate environmental education during teaching and learning process.

### Conceptual Framework

A conceptual framework is the system of concepts, assumptions, expectations, beliefs and theories that support and inform research (Maxwell, 1996). It is an argument that the concepts chosen for investigation and any anticipated relationships among them will be appropriate and useful given the research problem under investigation (Lester, 2005). The paper focused on teachers' knowledge about environment, integration, environmental education, and the integration of environmental education.

Ward et al. (2013) described environment as the surroundings and its' influence on a particular interest. It follows that in this paper, environment refers to the natural surroundings because it accommodates and influences all living and non-living organisms. Integration is a process of combining things (Rouse, 2018). Thus, in this paper, integration refers to an action of combining two or more things because the focus was to explore how environmental education has been integrated. As a result, the combination in this context, which is integration, takes place between environmental education and the process of teaching and learning.

Environmental education refers to organised efforts that are needed in order to teach about the functions of natural environments and how human beings manage ecosystems as well as their behaviour in order to live sustainably (UNESCO, 2014). Environmental education is a process that involves the relationship between human beings, the artificial and natural environment, which includes pollution, population, sustainability, and the relationship between rural and urban as well as the entire human environment (Legood et al. 2016). Therefore, in this paper, environmental education is a process that teachers utilise towards constructing knowledge, skills, values and attitudes, because these aspects are needed to enhance environmental awareness in teaching and learning in order to cultivate responsible environmental citizens that are able to take actions towards environmental protection and sustainability.

The integration of environmental education is the process of creating awareness and developing an understanding about environmental issues in teaching and learning (Downey, 2016). In this paper, the integration of environmental education is when the teacher considers the school surroundings, the curriculum of the subject and environmental issues because they provide a framework to integrate the lesson content with environmental education in teaching and learning. Fontanez (2012) described a challenge as a situation that is considered as threatening. However, in this paper, a challenge is interpreted as problems or unfavourable situations because they can impede or prevent anything from happening and opportunities as conditions that are considered to be favourable because they result in situations that can offer advantages.

## Purpose of Research

The purpose of this paper was to explore how senior phase teachers integrate environmental education in their teaching and learning process. This paper was aimed at assisting teachers in developing a positive approach to the process on going attempts and the will to integrate environmental education. To explore the challenges and the opportunities that teachers encounter when they must integrate environmental education. As a result, teachers who have similar circumstances would use the findings from this paper as a launch pad to work on the strengths or weakness in the endeavour to integrate environmental education in teaching and learning process.

## Problem of the Study

The research problem of this paper was built from one of the researchers' anecdotal experience. It was observed that there was minimal or no integration of environmental education in the teaching and learning process. It was evident that the integration of environmental education is embedded with challenges such as inadequate knowledge of what environmental education entails (Msezane, 2014). This situation was not different to what was encountered during the researchers' training to be a teacher from the schools where they acquired their teaching practice. As a result, this paper explored how senior phase teachers integrate environmental education in their teaching and learning. Main research question:

How do senior phase teachers integrate environmental education in their teaching and learning?

Sub-questions;

- What is the nature of the teachers' environmental education knowledge?
- What challenges and opportunities do teachers have when integrating environmental education?
- What challenges do teachers for them not to integrate environmental education?

## Method

### Research Design

A qualitative interpretative case design was used in our attempt to comprehend what teachers do when they say they are integrating environmental education. We chose case study design to have a broad contextual analysis of each case as well as their relationship (McMillan & Schumacher, 2014). As such we also do not have a problem in declaring upfront that this paper is value laden with our views and attitude on what environmental education entails as well as how it should be integrated. In our endeavour to understand how teachers integrate environmental education, this paper focused on the teachers' knowledge about environment, integration, and environmental education. It also focused on the integration of environmental education as well as challenges and opportunities for the integration of environmental education.

### Participants

Three teachers who taught life orientation, technology, and natural sciences in grade 7 participated in this research. We chose grade 7 for convenience purposes. All the three teachers had a teaching experience of not less than 8 years. They were all well qualified to teach in the senior phase as well as the subjects they were teaching. Purposeful sampling was used to select these participants based on the purpose of this paper with the belief that each participant will provide rich and unique data (Suen, Huang & Lee, 2014). It can be seen at Table 1 that describes the demographic structures of each participants:

**Table 1.**

*Demographic Structures of Participants*

No	Subject taught	Gender	Age	Seniority	Grade	Qualifications
P1	Life Orientation	Female	46	24 Years	7-9 <sup>th</sup>	Bachelor of Education and Diploma
P2	Technology	Male	49	25 years	7-9 <sup>th</sup>	Diploma
P3	Natural Sciences	Male	57	30 Years	7-9 <sup>th</sup>	Diploma, Bachelor of Education, Advanced Certificate in Education

### Data Collection Tools

#### Interview Form

An audio recorder was used to record the interview process. This was done with the consent from the participants to ensure reliability and that all data collected is not misinterpreted during the data analysis process. Semi-structured interviews were used to collect data whereby more open questions were asked which allowed enable discussions with

the participants rather than straightforward questions and answer (Doyle, 2019). During face-to-face interviews, the researchers ensured that they ask all participants same open questions followed by further probing and clarification (Nieuwenhuis, 2016).

### **Observation Form**

An observation tool and audio recorder were used to collect data during lessons observations to ensure accuracy of data collected. The researchers were non-participants' observers as the aim was to observe activities that were conducted by teachers without taking part in them (Sheroz, 2013). The researchers observed and recorded all teaching and learning activities that took place which were transcribed and analysed.

### **Validity**

The researchers ensured that the paper has internal validity by making sure that the findings of the paper are based on data collected for this paper only. This was done to ensure that the data collected is credible, plausible and trustworthy (Bashir, Tanveer & Azeem, 2008).

### **Credibility and Trustworthiness**

To ensure that the study is credible and trustworthy, direct quotations from the participants were used when presenting all data collected. This was done to ensure that the findings of this research represent credible information that is directly drawn from our participants through their prolonged engagement during data collection (Korstjens & Moser, 2018).

### **Triangulation**

Methodological triangulation was used to increase validity and credibility of our research findings (Noble & Heale, 2019) wherein interviews and observations were used. Consequently, what the teachers said in the interview, for example in terms of what environmental education entails, was compared with what the teacher did in classroom during lesson observations.

### **Data Analysis**

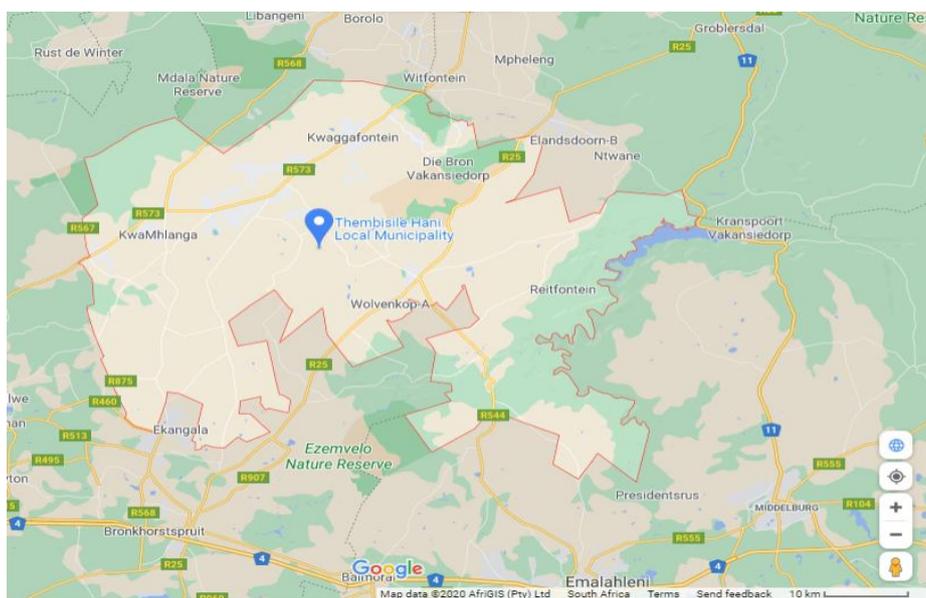
Data was presented through the emergence of categories and themes. A typology approach was used to analyse data based on the research questions, themes, conceptual framework, literature review, personal experience of the researchers and it was aligned to ensure that data is organised accordingly to enhance identification of analysis patterns (Hatch, 2002). Each case was analysed and interpreted as a single case. Participants were coded as; Participant Number (PN)/Gender (F/M) and Age. Case 1 for life orientation: P1-F-46, Case 2 for technology: P2-M-49 and Case 3 for natural sciences: P3-M-57. The transcribing process was done using the analytical framework. The researchers transcribed all audio interviews and lesson observations word for word. Errors and grammar were not corrected to ensure that all data collected was interpreted accordingly and does not lose its original meaning.

Data was coded by reading all transcripts and lesson observation schedule constantly. Topics were turned into categories whereby data belonging to each category was prepared for analysis. Coding was done on topics related to the main research questions and sub-questions. The researchers used the coding process to develop a description of themes whereby themes were reduced. During this process, the conceptual framework and literature was consulted to be in line with the research questions. The following became themes and categories from which data was organised: teacher's knowledge of the environment, integration, environmental education, integration of environmental education and lastly, the challenges and opportunities of integrating environmental education. These themes were derived from the literature reviewed, research question as well as the aim of this paper. The developed themes and categories enabled researchers in answering the research questions of this paper (Ryan & Berbard, 2003).

### **Procedures**

#### **Research Location**

This research was conducted in the Republic of South Africa. The government consists of two national education departments, which is the Department of Basic Education (DBE) and the Department of Higher Education and Training (DHET). There are nine provinces in this country which are made up of their own Provincial Departments of Education (PDE). Every PDE is made up of municipalities, districts, and districts are made up of circuits. The Mpumalanga Province consist of three districts, namely the Ehlanzeni district, Gert Sibande district and Nkangala district. The setting of this paper was in Nkangala District under one of the local municipalities which is Thembisile Hani Local Municipality in Tweefontein South Circuit. The school was chosen for convenience purposes. The school is a senior phase school which caters for learners from grade 7 to grade 9. The school comprises of eight teachers, 240 learners and one school principal. The location of the study can be seen at Figure 1.



**Figure 1.**  
*The Location of the Research*



**Figure 2.**  
*Pictures of the School where Data was Collected*

**Data Collection**

Pre-interviews were conducted before lesson observations and post-interviews were conducted after the lesson observations. The interviews were conducted during working hours between 08:00 in the morning and 15:00 in the afternoon. The participants informed the researchers about their availability for interviews to avoid interrupting their

day-to-day activities. The face-to-face interviews were conducted for 30 minutes while factoring the ethical considerations of the participants.

The interviews were conducted in an area that was private and participants were allowed to select the appropriate environment in the school premises to conduct interviews. During observations, the researchers were non-participants' observers when data was collected, and participants were aware that they are being observed. The researchers observed all the lessons that were conducted by the participants in a classroom and outdoor learning environment.

## Results

In this section we presented the results of the cases separately. Our intentions were not to compare the cases but rather to comprehend them within their contexts which were diverse. Each case will be presented as P1-F-46 for life orientation, P2-M-49 for technology and P3-M-57 for natural sciences subject. Only the elements of data leading to the answering of the research questions are presented and discussed. The results were aimed at answering the following research questions:

### Case 1 Life Orientation: (P1-F-46)

#### Theme 1: Teacher Knowledge

It was very important for the purpose of this paper to tap into what the teacher understands about the concepts related to environmental education. The teacher understanding of what the environment is was broad as she indicated that environment is the surrounding. She mentioned that:

*"Hmm... according to me the environment is your surroundings, the place around your area that is your environment. Your class is your environment that is how I understand it."* (P1-F-46)

The teacher was of the impression that environmental education has to do with teaching about keeping the environment healthy. It was also important not only to understand what environmental education entails according to the teacher, but to know what it means to integrate environmental education in the teaching of the subject at school, which in this context it was life orientation. She indicated that the word integration on its own means combining things. She stated that when you integrate environmental education you must always make sure that your learners are always outside checking the environment. Yet, the teacher did integrate environmental education inside and outside the classroom environment, unaware.

During lesson observations we observed that the teacher did integrate environmental education, this was evident during the physical education and training that took place in an outdoor environment in the sports field and also in a classroom environment when she presented a lesson about abuse. During the physical education and training lesson, she taught about the importance of exercising in an environment that is not harmful to one and encouraged learners to ensure that their surroundings are always neat. When she taught about abuse she taught about different kinds of situations whereby one could find themselves being abused depending on the environment that they are in, she highlighted environmental factors such as community, poverty and unemployment which could result into any form of abuse. That gave her a platform to raise awareness about real life situations that affect individuals and the environment within content of abuse.

#### Theme 2: Challenges and Opportunities

For this paper, we had to find out the challenges that the teacher experienced when she had to integrate environmental education. Therefore, we saw that it was imperative for us to ask about her frequency of integrating environmental education. She indicated that she does not integrate it all the time, she only integrates environmental education depending on the lessons that she will be teaching at that time. Just like she did with the physical education and training as well as abuse lesson content when observed. She also indicated that:

*"Not always but sometimes I do integrate it depending on the topic that I am teaching at the present moment. For an example, if you are teaching rights you need to integrate environmental education... because they have to know how take care of their environment."* (P1-F-46)

We deemed this as a challenge because we are of the opinion that the integrating environmental education frequently is imperative as it contributes towards the efforts of solving environmental problems. This prompted us to find out about the challenges that she experienced that hindered her from integrating environmental education frequently. She asserted that:

*“I think the challenge is the classes in most cases are over-crowded and that we do not have enough time to integrate environment because when you integrate environmental you must always make sure that your learners are always outside, because of the conduciveness of the class you cannot always integrate the environment even the movement is difficult in class.” (P1-F-46)*

During lesson observations it was noted that there were many learners in a small classroom which restricted teacher movement. She also indicated that there was not enough time for one to integrate environmental education. However, her statement was a contradiction as the teacher had enough time available to ensure the integration of environmental education was done frequently but the time was not used effectively. This was evident from the observations whereby the teacher seemed to be overwhelmed by her lessons, which led her to frequently ask about the amount of time that was remaining so that she can leave the classroom and on the sports field on two different lessons that she presented. It was also worth to note that there were opportunities for the teacher to integrate environmental education in her lesson. She indicated the following:

*“I think opportunities are there if we can have our classes that are manageable, you can integrate this environmental education.” (P1-F-46)*

This statement was very broad which led us to enquire more about these opportunities. The teacher indicated that if she could have 30 learners in a classroom, it would result in an opportunity that could enable her to integrate environmental education frequently.

## **Case 2 Technology: (P2-M-49)**

### **Theme 1: Teacher Knowledge**

Environmental education meaning is important when one is attempting to comprehend how a teacher integrates or not integrate environmental education in his teaching. As a result, we had to tap into what the teacher understands about the concept of environment, which he indicated that environment refers to the nature that we live in which accommodates living and non-living things. The teacher indicated that environmental education is about creating awareness and developing a deeper understanding about the environment that we live in. It was important to find out what the teacher understands about the word integration. He indicated that integration refers to accommodating different types of things that can be found in the environment, which means that one has to link them to those that are living and non-living things so that we can be able to achieve a good habitat on the environment.

He stated that when you integrate environmental education you must ensure that you present lessons that are related to environmental education in a practical manner, if possible. However, during lesson observation he did integrate environmental education when he taught about building a cell phone tower structure and different types of environments where one can find pilot structures, headgear structures and windmill structures. Yet, he was not aware of it because he was of a mind that environmental education can only be integrated through practical and school excursions which are misconceptions.

We also observed that the teacher did integrate environmental education in his lessons, which in this context was the Technology subject. He presented a lesson about investigating cell phone towers, he was observed raising awareness and sensitivity about the environment, taking into consideration visual pollution when building a cell phone tower. In this paper, visual pollution is defined as a visual issue that harms one's ability to enjoy a certain view. The teacher taught about the importance of being aware of visual pollution, which can harm the environment by creating harmful changes in it and to consider the environment where the tower will be situated. Furthermore, during his lesson he emphasized that it is important to ensure that when one builds a cell phone tower structure it must be disguised so that the environment, people or animals that are around there would not be visually polluted when they look at the tower. His lesson gave him an opportunity to come up with examples about nature reserves where he outlined the significance of making a tower that looks like a tree so that animals are protected from visual pollution especially when they look at the tower.

### **Theme 2: Challenges and Opportunities**

It was important for the purpose of this paper to find out about challenges that the teacher experienced when he had to integrate environmental education. It was noted that the teacher had incorrect conceptualization towards the integration of environmental education as he mentioned that environmental education can only be integrated through practical education and school excursions. However, we are of the opinion that the above statement contributes towards the challenges because it clearly demonstrates that environmental education is not integrated effectively in some of the learning topics that do not accommodate for practical education and school excursions. This made us inquisitive to find out more about the challenges that he experienced. During the interviews, he indicated that a lack

of learning materials served as a challenge as it impeded the integration of environmental education in teaching and learning process. He indicated that:

*“Sometimes we have a handicap of learning material. When you request the purchasing of learning materials, sometimes it is an issue.” (P2-M-49)*

In addition to that, it was evident from the lesson observations that were conducted that the teacher was unable to administer the hands-on project of building a cell phone tower effectively due to insufficient materials. Materials such as wires, batteries or bulbs that were needed to build the cell phone tower project but were not available. This had an impact in the integration of environmental education because the teacher was not able to effectively raise awareness about the important specifications that should be evident when building a cell phone tower so that the environment can be protected.

Furthermore, we observed that the teacher had a limited number of textbooks for the technology subject. This served as a challenge towards the integration of environmental education in the lesson that he presented about different types of structures. He used a textbook as learning material, which was shared by three to five learners per textbook. This hindered the integration of environmental education due to insufficient textbooks as he asserted that he integrates environmental education by using pictures that are available in the textbooks.

We discovered that there are limited opportunities underpinning the integration of environmental education. For instance, the teacher mentioned that he does integrate environmental education and we were intent towards finding out how does he integrate it. He stated that he tries to explain to the learners, and they use the pictures that are available in the textbook as it is also important to integrate environmental education in teaching and learning process. During lesson observations, the teacher was observed using pictures that are available in the textbooks when he taught about structures. This created an opportunity that allowed him to relate the lesson topic to real life situations which enhanced knowledge and understanding of the environment. He highlighted that:

*“Yes, I think it is important to integrate Environmental Education, because we are living on the environment and there are many dangers that are posed by the environment that we are not aware of. In addition, even learners themselves they need to be aware about the other things that we find in nature that are good which may be regarded as bad” (P2-M-49)*

Based on the data collected from interviews and lesson observations, we can infer that the teacher was aware of the importance and opportunities of integrating environmental education but he had a limited amount of knowledge about opportunities that come with it.

### **Case 3 Natural Sciences: (P3-M-57)**

#### **Teacher Knowledge**

Tapping into what the teacher comprehends about environmental education was important for the purpose of this paper. We asked the teacher about what he understands regarding the concept of environment. His response was that environment can be defined in various ways depending on the approach of certain topics that he engages himself with. He revealed that environment is based on the surroundings, where we stay, which is also a situation whereby there is life and even where there is no life. He mentioned that:

*“The environment is based on the surroundings where we are staying, it depends on where you are. Now, when we talk of surroundings and the environment, we are referring to a situation whereby there is life and even where there is no life. It will depend on the approach of the topic that we are dealing with yes.” (P3-M-57)*

The teacher was of the opinion that environmental education refers to being educated about your surroundings, being taught on how to take care of the environment and having skills to see the problems that affect your surroundings so that you can find ways on how to solve them. It was also important not to only understand what environmental education is in terms of the teachers built, but to also be familiar with the concept of integration in order to develop a basis of the integration of environmental education in context of the natural sciences subject. His response on the word integration was rather broad, as he mentioned that integration refers to taking different subjects and looking for what is common in them, he even engaged various examples to ensure that one can easily understand what he meant. However, as much as his statement was broad at first glance, he elaborated further to support his description so that it could have a clearer meaning. He indicated that:

*“For example, I can integrate science with mathematics, if I take learners outside and say let them be in groups, then I tell them to make groups of five members, it is also part of mathematics. I am integrating, I am not be teaching in digits; but I will be*

*talking about numbers. In addition, I will be talking about numbers when I say let us go to a dumping zone to sort materials, we will also count them, by doing so, we will be integrating.” (P3-M-57)*

Furthermore, he stated that the integration of environmental education can only take place in some school subjects as they have contents on how to take care of the environment and through practical assessment only, which in this context is a misconception. As we observed him integrating environmental education in his lesson with and without any practical assessments. The integration of environmental education was evident when he presented a lesson on recycling, whereby he taught about issues that affect the environment, which in this context was pollution and landfills that are not managed properly. He taught about the importance of making the environment conducive to prevent pollution.

The teacher was able to relate the lesson of recycling to real life situations that affect the environment in a way that it encourages learners to improve and resolve environmental challenges. He did so by giving them an illustration of what is currently happening in the community regarding old women and men that collect tins and bottles for recycling, as that they see them on daily basis so that they can develop a deeper understanding of environmental issues. As a result, it was clear that the teacher knew what environment is, integrate, environmental education but had a misconception when it comes to explaining what is to integrate environmental education. However, based on our findings we can conclude that the teacher did integrate environmental education in his lesson.

### Challenges and Opportunities

This paper revealed that the lack of learning materials and school environment were some of the challenges that the teacher experienced when he had to integrate environmental education. He stated that:

*“Challenges are always there, because when you integrate environmental education, sometimes you might not have enough material to use in class, especially those that can help learners to easily understand, sometimes you want to integrate education with the environment, but the school situation does not allow us.” (P3-M-57)*

Having integrated environmental education during lesson observations, we had to find out about opportunities that are available when one integrates environmental education. The teacher indicated that the usage of different learning environments could provide opportunities of integrating environmental education as learners could enhance better understanding of the lesson content presented. He asserted that:

*“Whatever we are experiencing outside, we must take it into a classroom situation. Whatever we are talking to learners, some learners might understand visual things. So now, whenever we take something on the environment outside into a classroom situation then learners understand it better.” (P3-M-57)*

Furthermore, he indicated that it is important to integrate environmental education as there are opportunities that could enhance teaching and learning process. He mentioned that:

*“Opportunities are many, because whenever you integrate learning, the learners tend to learn and develop love of doing something at home. For example, when you talk of the environment, there is this thing of hand sorting and Chromatography, all those things they are opportunities for learners to learn and be encouraged that in future, I can do this, it is very much important to know the environmental impacts.” (P3-M-57)*

## Discussion

### Teacher Knowledge

It was imperative for the purpose of this paper to tap into what teachers understands about the environment, integration, environmental education, and the integration of environmental education in teaching and learning processes as this shapes the purpose of this paper. A research that was conducted by [Ward, Grudnoff, Brooker and Simpson \(2013\)](#) defined the concept of environment as surroundings of and influences on a particular world or interest. Also, the (Department of Environmental Affairs and Tourism [DEAT], 2004) defined the concept of environment as surroundings in which humans and other organism's exist.

This is similar to *P1-F-46* who indicated that environment refers to surroundings. A similar perspective was given by *P3-M-57* when he defined environment is a surrounding whereby there is life and even where there is no life. However, *P2-M-49* gave a different view whereby he indicated that environment refers to the nature that we live in which caters for all the living and non-living species that are found in the environment. This relates to ([Downey, 2016](#)) who defined environment as a complex of numerous variables which surround human beings as well as all living

organisms, it also takes into account the relationship that exists between human beings, non-living things and other living things.

We had to tap into what a teacher understands about integration. In this paper, we defined integration as an action of combining two or more things to make something more effective. This relates with Makokotlela (2016) who stated that integration refers to the act of combining and *P1-F-46* had a similar view when she stated that integration is about combining things. On the other hand, *P2-M-49* had a different outlook when he said that integration is a process of accommodating different types of things that can be found in the environment, which means we need to link them to those that are living and non-living things so that we are able to achieve a good habitat on the environment. Furthermore, *P3-M-57* had a diverse opinion when he said that integration is about taking different subjects and looking for what is common in them based on his illustrations.

We defined environmental education as a process that teachers use towards constructing knowledge, skills, values and attitudes as these aspects are needed to enhance environmental awareness in teaching and learning in order to cultivate responsible environmental citizens that are able to take actions towards environmental protection and sustainability. It is aimed at developing environmentally literate citizens with the core knowledge and skills that are needed to take responsible action regarding to the natural environment (Adkins & Simmons, 2002).

*P1-F-46*' idea is likely to fit within Adkins' and Simmons (2002) perspective as she stated that environmental education has to do with teaching learners how to look after their environment. This is similar to *P2-M-49*' opinion as he described environmental education as a process of giving people knowledge about the environment in which they live. This would mostly relate with Zaini and Ita (2020) who emphasised on the importance of developing a deeper understanding and acquiring knowledge of environmental education as it serves an important element since a degraded environment means a lower quality of life for the whole world.

Furthermore, environmental education allows individuals to come up with approaches for problem-solving skills and taking action to maintain the environment to ensure that it continues to be sustainable. However, *P3-M-57* had a different view as he asserted that it is about being educated about your surroundings, being taught about how to take care of the environment and having skills to see the problems that affect your surroundings so that you can find ways in which to solve them. This relates to a research that was conducted by Zafar (2018) who defined environmental education as a holistic procedure that is aimed at creating responsible individuals who are able to identify environmental problems, engage themselves in problem-solving and take action towards protecting the environment.

The integration of environmental education is the process of creating awareness and developing an understanding about environmental issues in teaching and learning (Downey, 2016). In this paper, the integration of environmental education is when the teacher considers the school surroundings, the curriculum of the subject and environmental issues because they provide a framework to integrate the lesson content with environmental education in teaching and learning. However, *P1-F-46* had a different perspective where she as she said that when you integrate environmental education you must always make sure that your learners are outside checking the environment. While *P2-M-46* said that the integration of environmental education can only occur through practical education and school excursions. Subsequently, *P3-M-57* said that the integration of environmental education can occur in some school subjects as they have contents on how to take care of the environment and through practical assessment only, which is a misconception. This is a different perspective from the (Department of Basic Education [DBE], 2011), as it clearly stipulated in the curriculum assessment policy statement that environmental education content is integrated in all subjects and levels of the schooling system which is Grade R to Grade 12.

### Challenges and Opportunities

In this paper, we defined a challenge as problems or unfavourable situations as they can impede or prevent anything from happening. A research that was conducted by Rahman et al. (2018) revealed that time constraints were some of the challenges that teachers experienced. These findings were similar to what we discovered; *P1-F-46* indicated that she did not have enough time to integrate environmental education in her lessons effectively. This is similar to one of the researchers' teaching practice experience as it was observed that some teachers perceived environmental education as something that is time-consuming, which makes it difficult for them to integrate environmental education. This relates to Baruth (2009) who found out that most teachers are not interested to teach in a learning environment that consists of over-crowded classrooms.

However, *P2-M-49* experienced different challenges such as lack of learning materials when he had to integrate environmental education as did not have learning materials that could have contributed effectively to building a cell phone tower project which was embedded with a lot of environmental aspects. This challenge was similar to what *P3-*

M-57 experienced as he stated that there is lack of enough materials to use in the classroom when he must integrate environmental education. This is the most alarming factor for the reason that the research that was conducted by Zafar (2018) also revealed that limited course handbooks, materials and training on environmental education were the major constraints that developed enormous challenges. It was quite clear that the lack of access to teaching and learning materials has been an on-going challenge that seems to be the most contributing factor that impedes the integration of environmental education. Hence, these constraints have a negative impact on environmental education as it cannot be integrated effectively (Rahman et al. 2018).

P1-F-46 also highlighted that there are over-crowded classrooms which makes it difficult for her to integrate environmental education. As a result, most teachers are not interested to teach in a learning environment that consists of over-crowded classrooms (Downey, 2016). Furthermore, the teacher does not integrate environmental education often; she only integrates it sometimes depending on the topic that she teaches at that present moment. This clearly demonstrates that the teacher was not aware that environmental education is integrated across curriculum which is a challenge. However, P3-M-57 had experienced a different challenge regarding the issue of not having seniors. This relates with Rahman et al. (2018) who indicated that a lack of support from the school administrators and relevant stakeholders are one of the contributing factors that leads to challenges that impedes the integration of effective environmental education. Opportunities are situations that are contributing to the occurrence of task performance.

In this paper, an opportunity entails conditions that are favourable because they result in situations that can offer advantages. It was also important for this paper to acknowledge that environmental education provides important opportunities for teachers and learners to become engaged in real world issues that transcend classroom walls (Campbell & Chittleborough, 2014). Hence, P1-F-46 indicated that if she could have a manageable classroom size, she would be able to integrate environmental education effectively as there will be no overcrowding in classrooms.

Furthermore, she indicated that it was important for learners and the community to understand the importance of having a healthy environment as that will open more opportunities for one to learn more about the environment. Her view was similar to P3-M-57 who emphasised more on the importance of integrating Environmental Education. This relates with Makokotlela (2016) who found that the integration of Environmental Education is important as it educates learners about the natural environment so that they can live in a way that one respects and does not harm the environment.

### Conclusion and Recommendations

Numerous studies have been conducted about the history and development of environmental education. A research that was conducted by McCrea focused on the roots of environmental education, taking into consideration how the past supports the future since the roots of environmental education are diverse and extremely broad (McCrea, 2006). Furthermore, a study that was conducted by Simmons focused more on the history as well as the philosophy of environmental education (Simmons, 2010). As a result, this provided a foundation for this paper as our aim was to explore how senior phase teachers integrate environmental education in their teaching and learning.

The research findings indicated that environmental education is not integrated effectively in the teaching and learning process. It was evident that teachers who integrate and those that do not integrate environmental education encountered challenges. The results showed that the inadequate knowledge that teachers have about environmental education had a huge impact on how they integrate environmental education. Furthermore, we believe that the findings from this paper could assist teachers in developing a positive approach to the process of on-going attempts and the will to integrate environmental education. It could also expose the kinds of knowledge other teachers have of what entails environmental education and its integration in school subjects. The focus on the challenges and the opportunities could excite teachers who have similar circumstances to use the findings from this paper as a launch pad to work on their strengths or weakness in the endeavour to integrate environmental education. Hence, Sukma, Ramadhan & Indriyani (2020) revealed that it is important to integrate environmental education in the learning process for learners who are in primary school.

Teachers do not have adequate knowledge about the concepts of environmental education which led to them developing misconceptions about environment, integration, environmental education, and the integration of environmental education. Therefore, it is recommended that during training workshops these aspects must be clarified and clearly defined so that they can acquire adequate knowledge and skills towards the integration of environmental education as stipulated in the curriculum. Teachers encountered challenges such as a lack of learning materials when they must integrate environmental education. Therefore, teachers need to consider using learning resources that they

can easily obtain in their communities to create opportunities for learners to put their knowledge in practical use (Mahimuang, 2020).

### Recommendations for Applicants

Therefore, it is recommended that the Department of Education should provide teachers with adequate teaching and learning materials needed so that they can be provided with opportunities to integrate environmental education. Teachers do not integrate environmental education adequately and across the curriculum. Furthermore, the school, together with teachers, should introduce continuous environmental education programmes or competitions that cater to the curriculum, as this might assist teachers and learners to be aware of the importance of sustaining the environment and acquiring knowledge and skills on sustainable development practices.

### Recommendations for Further Research

This research was conducted in one school which it was a senior phase school which may also render this as a limitation. Therefore, it is recommended that further studies can be carried out in Early Childhood Development (ECD), Intermediate phase and Further Education and Training Phases (FET) whereby it will include a number of schools, circuits, districts or expanded provincially.

### Limitations of the Study

This research was only conducted with three teachers who teach Natural Sciences, Technology and Life Orientation subjects in Grade 7 but there was an in-depth analysis of each of these cases. This paper focused on one school and in that regard the researcher could not have known what the findings would be if the study was conducted in a larger number of schools, but it would be interesting for the study of this nature to be conducted in a higher number of schools in future. This paper was a case study, and the findings cannot be generalised to other teachers, but the findings can provide an insight for future studies into how teachers integrate environmental education.

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### Biodata of Authors



**Lettah Sikhosana** is a PhD student pursuing Doctor of Philosophy in Environmental Education qualification in the Department of Science and Technology Education at the University of South Africa. She was born in Kwaggafontein Mpumalanga province, South Africa, on the 25th of December 1994. She graduated with Master of Education in Environmental Education in April 2020, Honours Bachelor of Education in Environmental Education in May 2018 and Bachelor of Education in Senior and Further Education and Training Phases in March 2017 at the University of South Africa. She is a teacher by profession and teaches in Mpumalanga Province, South Africa

**Affiliation:** University of South Africa **E-mail:** [lettahsikhosana@gmail.com](mailto:lettahsikhosana@gmail.com) **Orcid number:** 0000- 0003-4406-7795 **Phone:** (+27) 60 912 5250 **Scopus ID:** - **WoS ID:** -



**Prof. Dr. Awelani V Mudau**, D.Ed., born in Johannesburg, South Africa, June 12. He obtained a Diploma in Secondary Teaching in 1996, Further Diploma in Education in 2004, Bachelor of Science with Honors degree in 2006, Master of Science in 2008, and a Doctor of Education degree in 2013 from Tshwane University of Technology. He is a full Professor in the Department of Science and Technology Education at the University of South Africa. **Affiliation:** University of South Africa **E-mail:** [mudauav@unisa.ac.za](mailto:mudauav@unisa.ac.za) **Orcid number:** 0000-0002-0827-5688 **Phone:** (+27) 12 429 6353 **Scopus ID:** 55859542200 - **WoS ID:** [-ABF-2202-2020](https://orcid.org/0000-0002-0827-5688)



**Sikhulile Bonginkosi Msezane**, is an Environmental Education Lecturer at the University of South Africa, He was born in South Africa, 24 May 1979. He completed his Diploma in Agricultural Sciences in 2004 and Bachelor of Science Degree in Agriculture at the University of Swaziland (UNISWA) in 2006. Pursued his Postgraduate Certificate in Life Sciences and Mathematics Education at the University of South Africa (UNISA) in 2009. He further completed his Master of Education Degree in Environmental Education in 2014 at UNISA, currently has submitted his Doctoral Degree in 2020 for examination. His research interests are assessment, teacher development and curriculum development. **Affiliation:** University of South Africa, South

Africa, Pretoria **E-mail:** [msezasb@unisa.ac.za](mailto:msezasb@unisa.ac.za) **Orcid number:** 0000-0002-0608-8301 **Phone:** (+27) 73 354 8165 **Scopus ID:** - **WoS ID:** -

## References

- Adkins, C., & Simmons, B. (2002). *Outdoor, experiential and environmental education: Converging or Diverging Approaches?* ERIC Digest.
- Baruth, G.G. (2009). *Grappling with large classes: Experiences of teachers, head of departments and principals in three rural schools in KwaZulu-Natal*. (Master of Education, Unpublished thesis). The University of KwaZulu-Natal, South Africa.
- Bashir, M., Tanveer, A.M., & Azeem, M. (2008). Reliability and Validity of Qualitative and Operational Research Paradigm. *Pakistan Journal of Statistics and Operation Research*; 4(1). DOI: 10.18187/pjsor.v4i1.59
- Campbell, C., & Chittleborough, G. (2014). The new science specialist promoting and improving the teaching of science in primary schools. *Teaching science, the journal of Australian Science Teachers Association* 1(9-29).
- Department of Basic Education. (2011). *Curriculum and Assessment Policy Statement*. Pretoria. Department of Education.
- Department of Environmental Affairs and Tourism. (2004). *Environmental management plans: Integrated environmental management, information series 12*. Pretoria. Department of Environmental Affairs and Tourism.
- Downey, K. (2016). *The importance of environmental education in America*. Retrieved from <https://www.lawstreetmedia.com/issues/education/environmental-education-america/>
- Doyle, A. (2019). *What is a semi-structured interview?* Retrieved from: <https://www.thebalancecareers.com/what-is-a-semi-structured-interviews-2061632>
- Hatch, J.A. (2002). *Doing qualitative research in educational settings*. Albany: State University of New York Press.
- Korstjens, I., & Moser, A. (2018). Series: Practical guidance to qualitative research. Part 4: Trustworthiness and publishing. *European Journal of General Practice*, 24:1, 120-124, DOI: 10.1080/13814788.2017.1375092
- Legood, A., McGrath, M., Searle, R., & Lee, A. (2016). Exploring How Social Workers Experience and Cope with Public Perception of Their Profession. *The British Journal of Social Work*, 46(7), 1872-1889. ERIC publishers
- Lester, F. (2005). On the theoretical, conceptual, and philosophical foundations for research in Mathematics Education. *ZDM*, 37(6), 457-467.
- Mahimuang, S. (2020). *Environmental education in basic education school: A case study of schools in Thailand*. The 2020 International Academic Multidisciplines Research Conference in Cape Town
- Makokotlela, M.V. (2016). *Determining the effectiveness of environmental education initiatives of selected government departments in South Africa*. University of South Africa.
- Maxwell, J. (1996). *Qualitative Research Design: An Integrative Approach*. Thousand Oaks: SAGE publications Ltd.
- McCrea, E.J. (2006). *The roots of Environmental Education: How the Past Supports the United Nations Educational, Scientific and Cultural Organization*. Aichi-Nogoya Declaration on education for sustainable development. Paris: UNESCO. Retrieved from [https://sustainabledevelopment.un.org/content/documents/5859Aichi-Nagoya\\_Declaration\\_EN.pdf](https://sustainabledevelopment.un.org/content/documents/5859Aichi-Nagoya_Declaration_EN.pdf)
- McCrea, E.J. (2006). *The roots of Environmental Education: How the Past Supports the Future*. ERIC publishers
- McMillan, J.H., & Schumacher, S. (2014). *Research in Education: Evidence-Based Inquiry*. 7th Ed. Pearson Education.
- Nieuwenhuis, J. (2016c). *Qualitative research designs and data gathering technique*. In Maree, K. First steps in research. Pretoria: Van Schaik publishers.
- Noble, H., & Heale, R. (2019). Triangulation in research, with examples. *Evid Based Nurs* 10.1136/ebnurs-2019-103145
- Rahman, N.A., Halim, L., Ahmad, A.R., & Soh, T.M.T. (2018). Challenges of Environmental Education: Inculcating Behavioural Changes among Indigenous Students. *Creative Education* 9(43-55).
- Rouse, M. (2018). *Integration*. Retrieved from <https://searchcustomerexperience.techtarget.com/definition/integration>
- Ryan, G.W., & Bernard, H.R. (2003). Techniques to identifying themes. *Field Methods*. 15(1): 81-109. <http://dx.doi.org/10.1177/1525822X02239569>
- Simmons, D. (2012). *Developing a framework for National Environmental Education Standards*. In papers on the development of environmental education standards. Troy, OH: NAAEE.
- Suen, L.J., Huang, H.M & Lee, H.H. (2014). A comparison of convenience sampling and purposeful sampling. *The journal of Nursing* 61(3), 105-111. DOI: 10.6224/jn.61.3.105
- Sukma, E., Ramadhan, S., & Indriyani, V. (2020). Integration of environmental education in elementary schools. *Journal of Physics: Conf. Series* 1481 012136 doi:10.1088/1742-6596/1481/1/012136
- United Nations Educational, Scientific and Cultural Organization. (2014). *Declaration on education for sustainable development*. Aichi-Nogoya Paris: UNESCO.
- United Nations Educational, Scientific and Cultural Organization. (2018). *Issues and trends in education for sustainable development*. Paris: UNESCO. 26-27.
- United Nations. (2019). *Report of the Secretary-General on Sustainable Development Goals*. United Nation Publications
- Velepini, K.M. (2017). Infusion or Confusion: A meta-analysis of environmental education in the 21st century curriculum of Botswana. *Africa Education Review* (1-6).
- Ward, D., Grudnoff, L., Brooker, B., & Simpson, M. (2013). Teacher preparation to proficiency and beyond: Exploring the landscape. *Asia Pacific Journal of Education*, 33, 68-80. doi: 10.1080/0218879.2012.751896.
- World Environmental Education Congress. (2019). Retrieved from <https://weec2019.org>
- Zafar, S. (2018). *Insights into environmental education*. Retrieved from <https://salmanzafar.me/environmental-education>
- Zaini, M & Ita. (2020). Students' attitudes toward preservation of the school environment through inquiry-based learning. *Eco. Env. & Cons.* 26(1), 61-68.

## **Appendixes**

### **Appendix 1.**

#### *Interview Form*

#### **Interview Schedule**

##### **Educational Background and Teaching Experience**

1. Please tell me about your educational background, where did you study and for how many years?
2. How long have you been teaching?
3. How long have you been teaching the subject that you are currently teaching?

##### **Environmental Education Knowledge**

##### **Pre-Observation Interview Questions:**

1. What is environment according to you?
2. How can you explain the word “integrate”?
3. What do you understand by “environmental education”?
4. Do you integrate environmental education during teaching and learning process?
5. If yes, how do you do that? If no, why are you not integrating it?
6. What are the opportunities of integrating environmental education?
7. What challenges do you experience when you integrate environmental education?
8. How do you address the abovementioned challenges, if not why?
9. What misconceptions do you know that are associated with the integration of environmental education in teaching and learning?
10. Do you think it is important for you to integrate environmental education?

##### **Post Observation Interview Questions:**

1. Did you enjoy presenting your lesson today?
2. Which part of your lesson presentation did you enjoy the most?
3. What challenges did you encounter during the lesson?
4. How well did you integrate environment education in your lesson?

**Appendix 2.**

*Observation Form*

**Lesson Observation Schedule**

**Aspects to be Observed During Lesson Observations of the Three Participants**

**1. Teacher Knowledge**

1.1 Environmental education knowledge

.....

1.2 Length of the lesson

.....

1.3 Use of prior knowledge

.....

1.4 Misconceptions of environmental education

.....

**2. Challenges and Opportunities**

2.1 The challenges that they experience when they are or not integrating environmental education in teaching and learning process.

.....

2.2 The opportunities of integrating environmental education in teaching and learning process.

.....