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Overviewing the Incorporation of Environmental Education in Teaching and Learning by Teachers

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Abstract

This study overviews the incorporation of environmental education within the senior phase curriculum in three selected primary schools in a district situated in the Mpumalanga province of South Africa. By examining the implementation process, pedagogical approaches, and perceived outcomes, this study aims to provide comprehensive insights into the effectiveness of incorporating environmental education at this educational level. The study involved three purposively selected grade 7 teachers as participants. Through a multiple case study design, the study explores the alignment of environmental education with broader educational goals, the challenges encountered, and the strategies teachers employ. Qualitative data were collected through interviews and classroom observations. The study demonstrated that teachers encountered fundamental challenges incorporating environmental education in the senior phase. These challenges include inadequate resources, time constraints within an already demanding curriculum, teacher preparedness, and the need for innovative assessment methods. The findings contribute to the localized context and offer valuable implications for enhancing environmental education incorporation in senior phases across diverse educational settings.

Keywords: Environmental education, Teacher knowledge, Incorporation, Learning environment, teaching and learning

INTRODUCTION

Since the 1960s, the main aim of environmental education is to produce citizens who are more motivated, active, and knowledgeable about environmental issues (Sultan et al., 2016). The goal of environmental education can be recognized as one of the prominent positive transformations of an individual's environmental knowledge, ethics, awareness, attitudes, and behavior (Sukma et al., 2020). Environmental education plays an important role in fostering sustainable development by equipping individuals with the necessary knowledge and skills to address global environmental challenges and instilling basic behaviors of sustaining the environment (Kadarisman & Pursitasari, 2023). Hence, in South Africa, a country known for its rich biodiversity and intricate ecological systems, incorporating environmental education within the formal education system has gained prominence. This shaped the interests of this study to overview the incorporation of environmental education in senior-phase teaching and learning in schools. The senior phase is considered to be a critical stage of formal education that lays the foundation for learners' broader understanding of the world around them and their roles as responsible citizens. As environmental concerns continue to gain urgency on the global stage, understanding how environmental education is being integrated into formal education becomes essential for fostering a generation of environmentally conscious and proactive

citizens. Informing students about the environment, environmental education, climate change, sustainable development, and global citizenship is a crucial role for teachers, as stated by the United Nations Educational, Scientific, and Cultural Organization (UNESCO, 2021). As a result, a great deal of research has been done to determine the attitudes and understanding that educators and students have about the environment, environmental education, and education for sustainable development (ESD).

Swarts et al. (2015) researched how teachers may effectively integrate environmental education in the foundation phase (grade R–3). Mudaly and Ismail's (2016) study focused more on teacher development towards acquiring context knowledge of environmental and sustainability education. This was not the case with Pauw and Petegem (2017), whose research went beyond the categories of the influence of environmental policy and the character of school aims and didactics. As a result, Thor and Karlsudd (2020) concentrated their efforts on teaching and promoting environmental awareness activities to promote action-oriented environmental education. Edsand and Broich (2020) examined how school environmental education may account for diversity in learners' environmental literacy. These empirical studies were used to overview the incorporation of environmental education within the senior phase curriculum in three selected primary schools in a district in the Mpumalanga province of South Africa. Examining the implementation process, pedagogical approaches and perceived outcomes aims to provide comprehensive insights into the effectiveness of incorporating environmental education at this educational level. "The 2030 Agenda and the Sustainable Development Goals are our collective response to building a fair globalization" (United Nations [UN], 2019:17). This sentiment implies that deliberations on the sustainability of our planet are serious on a macro level. Hence, understanding the basic principles of sustaining the environment is paramount (Stone, 2017).

Environmental education is pivotal in transforming and rethinking education to change human lives and achieve sustainability (UNESCO, 2018). Numerous environmental problems, including pollution, deforestation, natural disasters, climate change, biodiversity loss, and overpopulation, afflict the world today (Zaini & Ita, 2020). Due to these environmental problems, World Environmental Education Day was established. Schools, environmental education centers, and government agencies get together to create instructional initiatives on this day (World Environmental Education Congress, 2019). By learning more about environmental education, these environmental problems can be resolved (Makokotlela, 2016). Since environmental education is already a component of the school curriculum and is interwoven across all courses, spreading awareness of environmental challenges is crucial.

Analyzing the success of South Africa's integrated environmental education programs is equally crucial (Makokotlela, 2016). Anecdotal evidence suggests that teachers do not necessarily integrate environmental education in senior-phase teaching and learning. This professional deficiency can partly be attributed to a lack of a coherent and implementable plan to integrate environmental education in senior-phase teaching and learning. Zaini and Ita (2020) highlighted teachers' lack of knowledge about environmental education, while Velempini (2017) examined the incorporation of environmental education in the secondary school curriculum. McCrea (2006) posits that environmental education is broad by its very nature. These findings shed light on the effectiveness of integrating environmental education within the senior phase and the broader implications for educational policy and practice in South Africa and beyond. In view of these practical considerations, this paper examined the incorporation of environmental education in senior-phase teaching and learning.

Conceptual Framework

According to Maxwell (1996), a conceptual framework is a set of ideas, presumptions, expectations, beliefs, and theories that guide research. It is a claim that, while analyzing the research problem under inquiry, the ideas selected for investigation and any expected linkages among them will be appropriate and helpful (Lester, 2005). The study looked at the environmental knowledge, integration, and application of environmental education among teachers. According to Ward et al. (2013), the environment is the surrounding area and how it affects a specific point of interest. The natural surroundings that all living and non-living things are accommodated in and have an impact upon are referred to as the environment in this study. Combining items is the process of incorporation (Rouse, 2018). In order to investigate how environmental education is incorporated, the term "incorporation" in this study refers to the combination of two or more entities. As a result, environmental education and the teaching and learning process are combined in this context—a process known as incorporation.

According to UNESCO (2014), environmental education refers to the systematic efforts required to teach people about the roles that natural environments play as well as how humans manage ecosystems and their behavior to live sustainably. According to Legood et al. (2016), environmental education encompasses the interaction between people and the natural and artificial environments, including pollution, population density, sustainability, and the relationship between the rural and urban areas as well as the complete human environment. Thus, environmental education is defined in this study as the process by which educators build students' knowledge, abilities, values, and attitudes. In order to develop responsible citizens

who can take action to support environmental protection and sustainability, these elements are necessary to raise environmental consciousness in teaching and learning.

Teaching and learning about environmental issues become more conscious and knowledgeable when environmental education is incorporated (Downey, 2016). According to this study, environmental education is integrated into teaching and learning when the instructor takes into account the curriculum, the school's surroundings, and environmental challenges. In this study, an opportunity is defined as a favorable circumstance that leads to a situation that can provide benefits, and a challenge is defined as issues or unfavorable circumstances that hinder or prohibit anything from happening.

Theoretical Framework

Incorporating environmental education in the senior phase of education is a crucial area of study, as it addresses the need to equip learners with knowledge, skills, and attitudes that foster environmental awareness and responsible citizenship. This study is underpinned by the Ecological Systems Theory developed by Bronfenbrenner (1977) as the underlying theoretical framework. The Ecological Systems Theory is the foundational framework for understanding how individuals interact with their environment at multiple levels. This theory emphasizes the interconnectedness of individuals with their immediate surroundings (microsystem), broader community and institutional influences (mesosystem), societal values and norms (macrosystem), and historical contexts (chronosystem). Applying this theory helps recognize the various ecological layers that influence incorporating environmental education in the senior phase. This theoretical framework aims to provide a structured approach to understanding the key components and principles that underpin the effective incorporation of environmental education in the senior phase. This theoretical framework provides a comprehensive lens through which to examine the incorporation of environmental education in the senior phase. By drawing upon theory, teachers can design effective curricula, teaching strategies, and assessment methods that foster a holistic understanding of environmental issues, promote sustainable behaviors, and empower learners to become environmentally conscious citizens.

Purpose of the study

This study provides insights into how environmental education is integrated into the senior phase curriculum, the strategies teachers adopt, the challenges encountered, and the perceived impact on learners' environmental awareness and actions. This is essential in shaping a learner's knowledge, attitude, and behavior towards the environment (Sumarno & Setiadi, 2023). By examining the local context, pedagogical approaches, and stakeholders' perspectives,

this research seeks to contribute to the scholarly discourse on environmental education incorporation and the practical enhancement of educational practices within the studied district.

Problem of the Study

The incorporation of environmental education in the senior phase can face several challenges that hinder its effective implementation. These challenges often arise from a combination of factors related to curriculum, resources, pedagogy, and institutional dynamics. Some of the problems that impede the incorporation of environmental education in the senior phase identified by Mashaba (2022), Msezane & Mudau (2014), and Matshe (2001) include:

- Lack of Curriculum Alignment: Environmental education might not be well-integrated into the existing curriculum framework, making it difficult for teachers to find appropriate places to incorporate it without disrupting the overall structure.
- High-Stakes Examinations: Senior phase education often culminates in high-stakes examinations that heavily influence learners' future academic prospects. Teachers may feel pressure to prioritize subjects covered in these exams, which can result in environmental education being marginalized.
- Limited Resources: Environmental education often requires hands-on experiences, field trips, and resources such as equipment and materials. Schools in resource-constrained areas might struggle to provide these opportunities, leading to a lack of practical engagement.
- Teacher Preparedness: Not all teachers might have received training or have a strong background in environmental education. This lack of preparedness can affect their ability to effectively integrate environmental topics into their teaching methods.
- Time Constraints: Teachers might feel constrained by time limitations, given the packed curriculum and the need to cover other subjects. Finding time to delve into environmental topics might be challenging.
- Perceived Irrelevance: Some teachers and learners might perceive environmental education as tangential to core subjects, resulting in a lack of enthusiasm or engagement with the material.
- Institutional Priorities: Schools might prioritize academic subjects deemed more critical for learners' future careers, potentially neglecting the holistic development that environmental education can offer.
- Assessment and Evaluation: Environmental education often relies on project-based learning and critical thinking, which can be difficult to assess through traditional testing methods, creating a mismatch between teaching approaches and assessment.

- Cultural and Contextual Factors: Curriculum content and teaching methods might not resonate with learners' cultural and local contexts, diminishing the relevance and impact of environmental education.
- Lack of Interdisciplinary Approach: Environmental issues often cut across multiple disciplines, requiring an interdisciplinary approach. However, the traditionally segmented nature of education might make it challenging to adopt such an approach.
- Community Engagement: Lack of community involvement and support can limit the real-world relevance of environmental education. Community engagement is crucial for linking classroom learning with practical applications.
- Policy and Institutional Support: The absence of clear policies or institutional support for environmental education incorporation can impede the efforts of educators and hinder the sustainability of such initiatives.

Addressing these challenges requires a multi-faceted approach involving curriculum redesign, teacher training, allocation of resources, policy adjustments, and community involvement. By acknowledging and working to overcome these obstacles, incorporating environmental education in the senior phase can be more effective and impactful. Accordingly, this study is guided by the following main research question;

How do senior-phase teachers integrate environmental education into teaching and learning?

In order to answer the main research question, the following sub-questions were formulated:

- What is the nature of teachers' knowledge about environmental education?
- What challenges and opportunities are associated with incorporating environmental education in senior-phase teaching and learning?
- What pedagogical practices are teachers adopting when integrating environmental education in senior-phase teaching and learning?

METHOD

Research Design

This research is qualitative and adopts a multiple-case study design (Wahyuni et al., 2023). A case study design enables the researcher to provide a broad contextual analysis of cases and their relationships (McMillan & Schumacher, 2014). A multi-case study is a kind of case study research in which two or more instances that differ in certain ways but have some commonalities are chosen and analyzed. Selection criteria for the instances may include typicality, diversity, replication, contrast, or theory testing.

Participants

This study had three teachers who instructed seventh-grade students in natural sciences, technology, and life orientation. Each of the three educators has over eight years of classroom experience. The individuals were chosen through purposeful sampling (Suen et al., 2014). A demographic profile of the participants is given in Table 1.

Table 1: Demographic profile of the participants

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

Data Collection

Classroom observations and semi-structured interviews were used to gather qualitative data. Discussions with the participants were promoted by open-ended questions (Doyle, 2019). Data collection methods used during the lessons included an audio recorder and an observation program. Since the researcher's goal was to watch teachers at work without getting engaged, she was a non-participant observer.

Data Analysis

Based on the research questions, themes, conceptual and theoretical framework, literature review, and the researcher's personal experience, a typology approach was employed to analyze the data. It was aligned to ensure that the data is organized appropriately to enhance the identification of analysis patterns (Hatch, 2002). Since this was not a comparative study, each case was examined and evaluated separately (Sari & El Islami, 2022). Participants were coded as; Participant Number (PN). Cases P1, P2, and P3 pertain to life orientation, technology, and natural sciences, respectively. All transcripts and class observation schedules were examined in order to code the data. Categories were created from the codes. The categories were used to generate themes. The following themes emerged during data analysis: teachers' knowledge of the environment, incorporation, environmental education, and challenges and opportunities associated with incorporating environmental education in senior phase teaching and learning. Generated themes enabled the researcher to answer the research questions (Ryan & Berbard, 2003).

Trustworthiness of qualitative data

During face-to-face interviews, participants were asked the same open questions (Nieuwenhuis, 2016). This was carried out to guarantee that the information gathered was reliable, believable, and trustworthy (Bashir et al., 2008). Through their extended participation throughout data collection, the participants provided reliable information (Korstjens & Moser, 2018). Methodological triangulation involving interviews and observations was used to enhance the trustworthiness of qualitative data (Noble & Heale, 2019).

Research site

This research was conducted in the Mpumalanga Province. The Mpumalanga Province consists of three districts: Ehlanzeni District, Gert Sibande District, and Nkangala District. The setting of this research is in the Nkangala District. The selected school caters for learners from grade 7 to grade 9. The school comprises eight teachers, 250 learners, and one school principal. The location of the research site and school where data was collected are depicted in Figure 1.

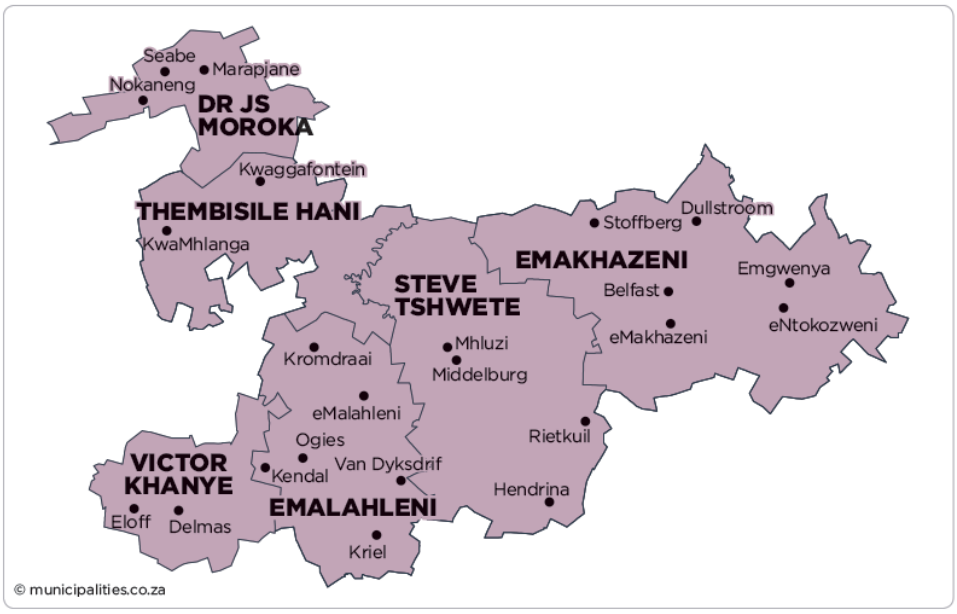

Figure 1: Location of the research site: Nkangala district

RESULTS AND DISCUSSION

The findings are presented according to the themes that emerged during data analysis. The cases are presented as follows: P1 for life orientation, P2 for technology and P3 for natural sciences.

Case 1 Life Orientation: (P1) Theme 1: Teacher Knowledge

The teacher demonstrated an incoherent understanding of environmental education. This incoherence in understanding is reflected in the following excerpt.

"Hmm… In my opinion, your surroundings—the space surrounding your area—make up your environment. In my opinion, your classroom is your surroundings." (P1)

According to the instructor, teaching students about maintaining a healthy environment is a key component of environmental education. When questioned about how to include environmental education into teaching and learning, the instructor said that you have to make sure that your students are constantly outside observing their surroundings. When teaching a lesson about abuse in the classroom and during physical education and training in an outdoor sports field, it was noted that the teacher included environmental education into her lessons. She emphasized to the students the value of exercising in a safe atmosphere and urged them to keep their surroundings tidy during the physical education and training session. In her abuse education, she covered a variety of scenarios in which a someone may become the victim of abuse based on their surroundings. She also emphasized the impact of social context, economic status, and joblessness on the possibility of abuse in any form. That provided her with a forum to spread awareness of actual circumstances involving abuse that have an impact on people and the environment.

Theme 2: Challenges and Opportunities

The incorporation of environmental education was consistent. The teacher indicated that she does not integrate environmental education all the time. The teacher further indicated that she only integrates environmental education depending on the lessons she teaches at a particular time. These sentiments are encapsulated in the following excerpt.

"Not often, but occasionally, depending on the subject I'm teaching at the time, I do combine it. For instance, you must incorporate environmental education if you teach rights. since they need to understand how to maintain their surroundings." (P1)

Overcrowding was highlighted as a factor that hinders incorporating environmental education in teaching and learning. In this regard, she asserted that:

"The difficulty, in my opinion, stems from the fact that most classes are packed and we don't have enough time to integrate the environment because doing so requires you to constantly ensure that your students are outside. Because of the conducive nature of the classroom, you can't always integrate the environment, even when it makes movement challenging." (P1)

They acknowledged that the incorporation of environmental education in teaching and learning affords learners meaningful opportunities to learn about sustainable environments. However, these opportunities can be harnessed when classes are manageable. She indicated the following:

" Opportunities, in my opinion, exist if we can manage our lessons and incorporate environmental education." (P1)

Case 2 Technology: (P2) Theme1: Teacher Knowledge

When trying to understand how a teacher incorporates environmental education into teaching and learning, it helps to understand what environmental education means. When asked what the term "environment" meant, the teacher said that it was the "nature that we live in which accommodates living and non-living things." According to the instructor, the goal of environmental education is to raise awareness of and foster a deeper understanding of the ecosystem in which we live. According to what he said, assimilation is making room for all kinds of objects that are present in the surroundings. According to him, if at all possible, you should deliver environmental education teachings in a realistic manner while integrating environmental education. When the teacher discussed how to design a cell phone tower structure and various situations where one may locate pilot, headgear, and windmill structures, it was noted that he integrated environmental education. However, he was unaware of it since he believed—a misconception—that environmental education could only be integrated through hands-on learning and school field trips.

I also observed that the teacher integrated environmental education into his lessons, which was a Technology subject in this context. When presenting a lesson about investigating cell phone towers, he was observed raising awareness and sensitivity about the environment, considering visual pollution when building a cell phone tower. In essence, the lesson developed learners' understanding of visual pollution.

Theme 2: Challenges and Opportunities

As reflected in the following excerpt, the lack of learning material stifled meaningful incorporation of environmental education in teaching and learning.

" We occasionally face a learning material handicap. There are situations where there are problems when you ask to have educational materials purchased." (P2)

Furthermore, meaningful integration of environmental education into teaching and learning was hindered by teachers' incapacity to apply project-based learning. There were no wires, batteries, or lightbulbs available to complete the cell phone tower project. The teacher was unable to effectively raise awareness about the crucial requirements that must be met while constructing a cell phone tower in order to safeguard the environment, which negatively impacted the inclusion of environmental education.

In addition, I saw that the teacher's collection of technology texts was really small. This provided a challenge for him to include environmental education in his lesson about the many kinds of structures. He provided three to five students' textbooks as learning resources.

When teaching about structures, the teacher used images from the textbooks during class observations. This gave him the chance to connect the lesson's subject to actual circumstances, which improved his awareness of and comprehension of the surroundings. He emphasized that:

> *"Absolutely, I believe that integrating environmental education is crucial because we live in a world where there are several risks that we are unaware of. Furthermore, even students themselves must be aware of the numerous positive aspects of nature that are sometimes misunderstood as negative" (P2)*

Case 3 Natural Sciences: (P3) Teacher Knowledge

When asked about the environment, the teacher indicated that the environment can be defined in various ways depending on the approach of certain topics that he teaches. He indicated that the environment is based on the surroundings, where we stay, which is also a situation where there is life and even where there is no life. He mentioned that:

> *"The setting varies depending on where you are and the surroundings in which we are staying. Now, we refer to both situations where there is life and those where there isn't when we speak of the surrounds and the environment. Yes, that will depend on how we handle the subject at hand." (P3)*

According to the instructor, environmental education includes knowing about your surroundings, learning how to protect the environment, and developing the ability to identify issues that have an impact on your community. In response to a question concerning his interpretation of incorporation, he says that it involves taking disparate themes and identifying commonalities between them. He made the following indication:

> *"For instance, I can combine science and mathematics by telling students to form groups of five when I take them outside; this is also a mathematical exercise. Though I won't be teaching in numbers, I am integrating and will be discussing numbers. When I say, "Let's go to a dumping zone to sort materials, we'll also count them, and by doing so, we'll be integrating math," I'll also be talking about numbers." (P3)*

Additionally, he said that only a few school topics could incorporate environmental education because they only covered environmental care through practical assessments and content, which is untrue in this particular situation. He lectured about environmental challenges during a recycling session, specifically pollution and improperly managed landfills. This was a

clear example of how environmental education was incorporated into the lesson. He imparted knowledge on the significance of creating an atmosphere that discourages pollution.

The instructor successfully connected the recycling lecture to actual environmental issues in a way that inspired students to make improvements and find solutions. He provided them with an example of what is going on in the neighborhood right now with reference to senior citizens who gather cans and bottles to recycle in order to gain a better awareness of environmental issues.

Challenges and Opportunities

Lack of learning materials and school environment were some of the challenges the teacher experienced when integrating environmental education. He stated that:

> *"There are always going to be obstacles in the way of integrating environmental education. For example, there may not always be enough resources available to use in the classroom, particularly those that make the subject easier for students to understand." (P3)*

In order to help students better understand the material being covered in class, the teacher suggested that utilizing various learning environments could present chances for incorporating environmental education. He claimed that:

> *"We have to bring everything we are going through outdoors into the classroom. Depending on what we are discussing with the students, some of them may grasp visual concepts. Therefore, when we include anything from the outside world into a classroom setting, students now grasp it better." (P3)*

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

> *"There are many of opportunities since once learning is integrated, students usually learn and get excited about completing things at home. When discussing the environment, for instance, there are activities like chromatography and hand sorting that provide learners with opportunities to learn and are motivating since they may be done in the future. It is crucial to understand the effects that these activities have on the environment." (P3)*

Teacher Knowledge

The study's findings on integrating environmental education in the senior teaching and learning phase are quite enlightening. Incorporating environmental education at this crucial stage positively impacts learners' awareness, attitudes, and behavior toward the environment. The study shows how this incorporation can be a powerful tool for fostering sustainable

practices among the future generation. Hence, teachers' knowledge shapes their attitude towards the environment (Noviana et al., 2019). While it plays an important role in learning awareness about protecting the environment (Kadarisman & Pursitasari, 2023). Teachers who took part in this survey, however, showed a lack of environmental understanding. According to research by Ward et al. (2013), the environment is the surroundings and factors that impact a specific world or area of interest. Furthermore, the environment is defined by the Department of Environmental Affairs and Tourism [DEAT], 2004 as the spaces in which people and other living things live.

The teachers further exhibited an incoherent understanding of incorporation. This incoherent understanding was inconsistent with the definition of incorporation articulated by Makokotlela (2016). The teachers' knowledge of environmental education was largely fragmented. Teachers use the process of environmental education to build students' knowledge, skills, values, and attitudes because these elements are necessary to raise students' awareness of the environment in the classroom and help them become responsible environmental citizens who can take action to protect the environment and promote sustainability. It aims to develop environmentally literate citizens with the core knowledge and skills needed to take responsible action regarding the natural environment (Adkins & Simmons, 2002). This fragmentation should be addressed as a priority to enable teachers to be effective agents in integrating environmental education in teaching and learning.

In addition, environmental education enables people to learn how to solve problems and take steps to preserve the environment so that it remains sustainable. Nonetheless, educators conveyed seriously erroneous opinions about the characteristics of their environment. Environmental education, according to Zafar (2018), is a comprehensive process meant to develop responsible people who can recognize environmental issues, participate in problem-solving, and take action to safeguard the environment.

Teachers' fragmented knowledge about the environment stifled meaningful incorporation of environmental education and teaching and learning. Teaching and learning about environmental issues become more conscious and knowledgeable when environmental education is incorporated (Downey, 2016). However, the Department of Basic Education (2011) states that the Curriculum and Assessment Policy Statement mandates the integration of environmental education content into all disciplines and levels of the educational system, ranging from Grade R to Grade 12.

Challenges and Opportunities

The senior phase is often packed with academic requirements and exam preparations. Therefore, the teachers are expected to establish effective instructional strategies that offer clear explanations and applicable knowledge for learners, which includes establishing compassionate and supportive interaction with learners, giving clear instructions to maximize learners' understanding, and motivating learners to become active during teaching and learning (Djami, 2022). Integrating a new subject like environmental education might be challenging due to time limitations, potentially reducing focus on the subject. Research conducted by Rahman et al. (2018) revealed that time constraints significantly impact teaching and learning. Teachers who participated in this study lacked specialized training in environmental education, making it difficult to deliver the content effectively. They also struggled to adapt teaching methods to engage learners in complex environmental topics. Hence, Fitriana et al. (2022) suggested that increasing learners' motivation in protecting the environment as a form of environmental damage control efforts can make a real contribution to reducing environmental damage. Traditional assessment methods did not capture the holistic learning outcomes of environmental education. Measuring attitudinal changes, behavior shifts, and practical applications can be difficult using standardized tests. Adequate resources, such as textbooks, materials, and equipment, are essential for impactful environmental education. Schools that lack these resources find it challenging to provide comprehensive learning experiences. Lack of resources such as textbooks, materials, and equipment stifled meaningful incorporation of environmental education in teaching and learning. A research study conducted by Zafar (2018) also revealed that limited course handbooks, materials, and training on environmental education were the major constraints that developed enormous challenges. Without strong support from school administration and education policymakers, incorporating environmental education could be seen as an additional burden rather than a valuable addition to the curriculum. Ensuring that all learners, regardless of their socioeconomic backgrounds or learning abilities, benefit equally from environmental education can be a challenge. Some students might have limited access to outdoor experiences or lack prior exposure to environmental issues.

Integrating environmental education taps into real-world issues that students are passionate about. It provides practical insights into climate change, sustainability, and biodiversity loss, making learning more relevant and engaging. Environmental education naturally lends itself to interdisciplinary learning. It allows learners to see the connections between various subjects, fostering a holistic understanding of environmental challenges. Hands-on activities, field trips, and outdoor projects provide learners with direct experiences of

the environment. These experiences are memorable, enhance their understanding, and foster a sense of responsibility. It is necessary and relevant as it supports instructional strategies teachers choose to engage learners in learning, delivering materials efficiently and creating an immersive learning environment (Djami, 2022). Environmental education can lead to positive behavioral changes, encouraging learners to adopt eco-friendly practices within and outside the classroom. This also can create a more environmentally conscious generation motivated to protect the environment (Fitriana et al., 2022). By understanding environmental issues, learners gain a global perspective. They learn about the interconnectedness of the world and the importance of international collaboration in addressing environmental challenges. Integrating environmental education during the senior phase can have a lasting impact on learners. They might carry the knowledge and values into adulthood, influencing their choices, careers, and societal contributions. Involving external stakeholders, such as local environmental organizations and community groups, can enrich the learning experience. These partnerships offer learners exposure to real-world experts and practical initiatives. Environmental education encourages critical thinking as learners analyze complex issues and explore potential solutions. It nurtures their problem-solving skills, which are valuable across various domains. Integrating environmental education cultivates a mindset of sustainability, where learners learn to balance human needs with the planet's health. This mindset can be applied to various aspects of life. Environmental challenges require innovative solutions. Integrating this education can inspire learners to think creatively and develop new ideas for addressing environmental issues. Environmental education provides important opportunities for teachers and learners to engage in real-world issues that transcend classroom walls (Campbell & Chittleborough, 2014). In navigating the challenges and embracing these opportunities, teachers can effectively integrate environmental education into the senior phase curriculum, preparing learners to be informed and responsible stewards of the environment.

CONCLUSION

Incorporating environmental education in the senior phase teaching and learning emerges as a compelling and transformative endeavour, with far-reaching implications for education and society at large. This study has delved into the multi-faceted landscape of integrating environmental education, shedding light on its challenges, opportunities, and profound impacts on students' cognitive, attitudinal, and behavioral dimensions. The findings underscore the importance of providing learners with a comprehensive understanding of environmental issues during this critical phase of their education journey. The opportunities that arise from such incorporation are numerous and profound. By connecting academic disciplines and real-world

experiences, environmental education fosters interdisciplinary thinking, encouraging learners to see the intricate connections between ecological, social, and economic systems. Practical learning experiences, from field trips to community engagement projects, deepen comprehension and engender a sense of responsibility and agency. Yet, the journey toward successful incorporation is not without its challenges. Time constraints within an already demanding curriculum, teacher preparedness, and the need for innovative assessment methods are all issues that must be addressed. Moreover, ensuring equitable access to environmental education, regardless of socioeconomic background or learning abilities, is paramount to avoid perpetuating educational disparities. As we stand at the intersection of education, environment, and sustainability, this study reaffirms that environmental education is not merely an additive element in the curriculum but a transformative force that shapes informed and responsible citizens. By nurturing an understanding of our environment's fragility and resilience, we equip learners with the tools needed to make conscientious decisions, both as individuals and as members of a global community.

In conclusion, incorporating environmental education in the senior phase teaching and learning stands as a promise. It invites us to bridge the gap between classroom learning and the world outside, cultivating a generation of thinkers, problem-solvers, and advocates who possess knowledge and a profound respect for the intricate web of life that sustains us all. This study serves as a foundational step towards a more sustainable future, where education catalyzes positive change and stewardship of our planet.

Based on the study conducted on the incorporation of environmental education in the senior phase of teaching and learning, several recommendations emerge to enhance the effectiveness of this transformative approach:

- Develop interdisciplinary curriculum frameworks that seamlessly integrate environmental education into existing subjects like science, social studies, and literature. This approach underscores the relevance of environmental issues in various contexts.
- Establish specialized training programs to equip teachers with the necessary knowledge, skills, and pedagogical approaches for delivering effective environmental education. These programs should focus on both content and instructional methods.
- Create a repository of high-quality resources, including lesson plans, multimedia materials, and case studies, to assist teachers in designing engaging and informative lessons that resonate with learners.

- Incorporate practical and experiential learning opportunities like field trips, outdoor projects, and community engagement initiatives. These experiences provide tangible connections to real-world environmental challenges.
- Rethink assessment methods to align with the holistic nature of environmental education. Consider incorporating project-based assessments, reflective journals, and peer evaluations to capture attitudinal shifts and practical applications.
- Develop strategies to ensure equitable access to environmental education for all learners. This could involve providing resources to underserved schools, offering alternative learning formats, and addressing diverse learning needs.
- Foster collaborations with external stakeholders such as local environmental organizations, government agencies, and community groups. These partnerships enrich learning experiences and offer students exposure to real-world experts.
- Advocate for the inclusion of environmental education in educational policies and curriculum standards and collaborate with educational institutions and policymakers to emphasize the significance of this incorporation.

In embracing these recommendations, educational institutions can capitalize on the immense potential of integrating environmental education in the senior phase. By nurturing environmentally literate and conscious individuals, we contribute to a more sustainable future while equipping learners with the knowledge and skills to address the pressing environmental challenges of our time.

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