



# Tracing The Footprints of Environmental Education in Teacher Education: A Review of Pre-Service Teachers' Training in Universities

Benjamin Damoah<sup>1\*</sup>

Bunmi Isaiah Omodan<sup>2</sup>

Journal for Educators, Teachers and Trainers, Vol. 14 (5)

<https://jett.labosfor.com/>

Date of reception: 19 May 2023

Date of revision: 07 June 2023

Date of acceptance: 13 July 2023

**Benjamin Damoah, Bunmi Isaiah Omodan(2023). Tracing The Footprints Of Environmental Education In Teacher Education: A Review Of Pre-Service Teachers' Training In Universities. *Journal for Educators, Teachers and Trainers*, Vol. 14(5). 184-196**

---

<sup>1,2</sup>Faculty of Education Walter Sisulu University Butterworth 4960 Eastern Cape South Africa



## **Tracing The Footprints Of Environmental Education In Teacher Education: A Review Of Pre-Service Teachers' Training In Universities**

**Benjamin Damoah<sup>1\*</sup>, Bunmi Isaiah Omodan<sup>2</sup>**

<sup>1,2</sup>Faculty of Education Walter Sisulu University Butterworth 4960 Eastern Cape South Africa

\*Corresponding Author

Email: bdamoah@wsu.ac.za<sup>1</sup>, bomodan@wsu.ac.za<sup>2</sup>

### **ABSTRACT**

Environmental education is an important aspect of pre-service teacher education as it helps to equip future teachers with the necessary knowledge, skills, and attitudes to effectively integrate environmental education into their teaching practice. It is essential to provide pre-service teachers with the professional skills necessary to become environmentally literate individuals and educators. This study aimed to critically assess the footprints of Environmental Education within the pre-service teachers' curriculum in universities and colleges of education. A thorough search of references and databases turned up 8550 academic articles and records, of which 19 satisfied the requirements for inclusion in a comprehensive analysis of Environmental Education in pre-service professional education. PRISMA technique was employed to demonstrate how data was collected sequentially and logically for the systematic review. The findings of the study among others include a lack of qualified lecturers in the field of environmental education at the faculties of education and a lack of framework for the teaching and learning of environmental education in most of the universities used for the analysis. It also emerged that there is a lack of clarity of EE curriculum structure in the teacher trainee universities. The study recommended that all teacher trainee universities and colleges should make environmental education compulsory modules for all pre-service teachers and Universities should organize workshops and capacity-building programs to equip teacher educators.

**Keywords:** Pre-service teacher, Environmental Education, Environmental literacy Teacher Education, Teacher trainee

### **INTRODUCTION**

The global environmental threats and unprecedented degradation of our ecosystems demand that citizens should be trained on environmental issues to avoid future catastrophes (Nadakavukaren & Caravanos, 2020). Environmental problems are becoming a reality in the modern world because of population growth, resource depletion, food shortages, expanding cities and urban areas, and the resulting pollution (Brusseau et al., 2019). The relevant skills, attitudes, and values acquired would undoubtedly raise the level of environmental literacy among the citizens. Environmentally literate people are willing to act on their decisions, make educated judgments about the environment, and engage in community activities (Kinslow, Sadler & Nguyen, 2019). The argument here is that a more environmentally conscious populace that takes decisions that are beneficial for the environment's health contributes to a more sustainable world. This is achieved through EE (Franzen, 2018).

Beyond one's immediate surroundings, the environment is everything (Brady, 2019). Another component of it is the social environment. People are shaped by their environments as much as they are created by them. The greatest human achievements throughout history have resulted from man's efforts to adjust and adapt to his environment for his benefit (Nordhaus, 2019). Without a doubt, man has progressed during this process, but at the price of the social, biological, and physical surroundings since nature cannot repair itself. Environmental education is a critical aspect of teacher education, as it prepares future teachers to effectively teach their students about environmental sustainability, conservation, and stewardship. By incorporating environmental education into teacher education programs, teachers can provide their students with the knowledge and skills necessary to become responsible environmental citizens (Potter, 2009).

There are several ways that environmental education can be incorporated into teacher education programs. One approach is to include dedicated courses or modules on environmental education. These courses can cover a range of topics, such as environmental science, sustainability, conservation, and environmental policy. Another approach is to integrate environmental education into existing courses. For example, teachers can be trained to incorporate environmental themes into their lessons in subjects such as science, social studies, and language

arts. This can be achieved through the use of case studies, field trips, and hands-on activities (Sukma et al., 2020).

It is also important for teacher education programs to provide practical experience in environmental education. This can be accomplished through field experiences or internships in environmental organizations or schools that emphasize environmental education. This hands-on experience can help future teachers develop the skills and knowledge necessary to effectively teach environmental education in their classrooms. The Tbilisi 1977 international conference, coupled with the agenda 21 declarations, encouraged world leaders to prioritize the need to incorporate environmental content into the school curriculum (Agbedahin, 2019). This has made EE an integral part of the school curriculum in the global education system. Implementing this innovative idea largely depends on the structure of the pre-service teachers' curriculum and training received at the various universities that offer qualifications in teacher education.

Environmental education proponents have always focused on pre-service teacher preparation as a means of advancing environmental literacy (Dada Eames & Calder, 2017). However, teachers have continued to begin their careers unprepared for the crucial duty of empowering individuals to make logical and rational environmental decisions. In 1985 UNESCO-UNEP took a bold decision to operationalize one of the key principles of Agenda 21 on EE. The division of Science, Technical, and EE under the auspices of UNESCO-UNEP designed an EE module for pre-service training of social sciences teachers and supervisors in all secondary schools (Türkoğlu, 2019). This template was to lead the global conversation on the inclusion of EE into the teacher education curriculum in all colleges and universities. Only by developing a foundational understanding of some of the scientific concepts that are essential for pre-service teachers will we be able to grasp and appreciate answers to the problems we currently face.

The UNESCO-UNEP module is based on pre-service teachers' training on EE. The curriculum was designed to prepare teachers holistically to integrate EE content through the spectrum of all social science-related fields, which include economics, the arts, ethics, and religion (Lane, 2006). The module's major goals are to

(i) encourage the development and transmission of information, skills, and affective characteristics related to the environment and its challenges; and  
(ii) increase proficiency in the teaching and supervision of the environmental dimension schools. The module covers:

(a) the philosophical and historical history of EE

(b) the fundamental information about the environment and its issues.

(c) teaching strategies, activities, and assessment in EE, and

(d) plans for the environmental component of secondary school social science, as well as methods for its creation, development, implementation, management, and assessment. This module's purpose is to assist educators and pre-service teachers in adding more environmental issues into their teaching. The themes explored in this module combine fundamental physics and biological ideas with environmental issues and concerns to provide a thorough understanding of both. It also examines a few ways teachers might include environmental themes in their curricula to increase students' awareness of environmental challenges (Sinha, 1985).

Despite the efforts of the International Environmental Education Programme (IEEP), and UNESCO-UNEP's recommendation of standardized global EE modules to higher institutions to incorporate EE into pre-service teachers' curricula in the 1980s, much is not seen in the academic space in the development of EE in universities. Disparities in the teaching and learning of EE are an existential issue affecting the development of EE. Teachers influence how well their students understand the environment, the problems it confronts, and potential solutions. The teachers themselves should have the necessary level of EE awareness. This suggests that EE themes need to be improved and integrated into all pre-service and in-service teacher training courses (Nagra, 2010).

The success of the educational policy will mostly depend on the teachers because they are the central figures in schools, regardless of how EE is included in the curriculum. A study conducted in South Africa revealed that in-service teachers are confronted with several challenges in the integration of EE into their respective areas. These setbacks include a lack of clarity on EE integration, and a lack of policy guidelines to support the teaching of EE content (Damoah & Adu, 2019). In-service teachers at the basic school are confused and unaware of the existence of EE in the curriculum (Damoah & Adu, 2020). This is demonstrable evidence that suffices to say that in-service teachers were not given orientation or training on the teaching of EE as part of their professional training at the institutions of teacher education.

Mosothwane and Ndwapi (2012) argued that colleges of education in Botswana have not incorporated EE into pre-service teachers' curricula and this has made teachers incompetent in the delivery of EE. The challenges encountered by in-service teachers in the implementation of EE policy create doubts and uncertainties about the quality of training received by pre-service teachers in the institution of higher learning. McKeown-Ice (2000) alluded in the study conducted in the United States of America that, nationally, nobody knows the standard of the EE element integrated into pre-service teacher training programs. Using a mail-in questionnaire, this study polled 715 teacher education institutes. The findings show that few regulations exist for EE in most schools and

that EE is not incorporated in most institutions in the US education system. This empirical evidence leads us to think about the state of the art in pre-service EE professional education at various universities with faculties of Education. It is essential to be familiar with the available data for pre-service teachers to establish whether there are environmental elements in their professional training in the development of EE. To be proficient in the teaching of EE content, pre-service teachers to follow certain trajectories as spearheaded by UNESCO-UNEP. The paper then systematically reviewed the modules studied by pre-service teachers from year one to year four during their training to unearth the disconnection in the development of qualified EE teachers.

### **OBJECTIVES**

Based on the arguments adduced above, the following research objective was created as a guide for the paper to address the research problem. The paper then:

Explore the environmental education curriculum for pre-service teachers and its associated challenges.

### **METHODS**

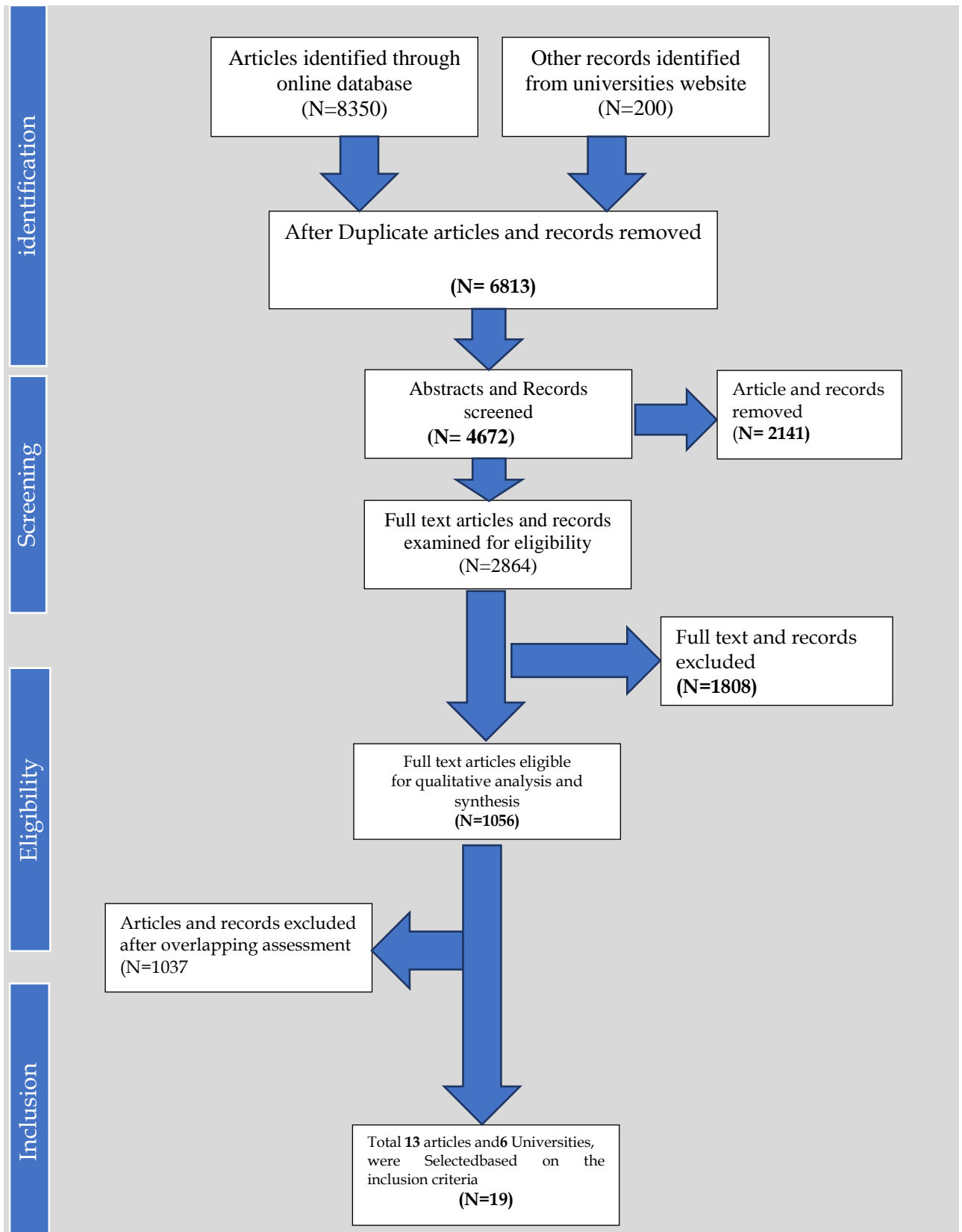
This review paper demands a thorough search of relevant data to support our argument. The searched items were mainly focused based on teacher trainees' modules in African universities, EE in student teachers' curriculum, training of pre-service teachers in EE, and environmental modules in pre-service teachers' education. We employed this systematic review method to scrutinize and synthesize in depth literature on the modules offered by the various universities toward the development of teachers who are well endowed with the requisite EE knowledge and methodology. Keywords of the phenomena were searched from the databases of Google scholar, Scopus, EBSCOhost, and SAGE.

### **Selection Criteria**

The screening criteria were based on Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA). The approach is a minimal set of criteria based on evidence that is intended to assist scientific authors in reporting a variety of systematic review studies (Shamseer et al., 2015). Finding information on the EE modules of pre-service teachers is the main goal of the search. The evaluation does not include any research that was released before 1990. The search was not limited to articles within the enclave of Africa.

### **Inclusion Criteria**

The inclusion criteria show which literature is relevant to the investigation (Stern et al., 2014). To identify the literature that was pertinent to the investigation, the inclusion approach was applied. The parameters that were used include a) date of publication; b) peer-reviewed articles; c) full articles excluding abstracts only papers; d) geographical location; e) type of publication. Due to the lack of literature in this field of study, we stretched the inclusion criteria from 1990 to 2022. This was insightful for the review process because it helped the paper to establish the quality of pre-service teachers produced by universities for the past three decades. 8350 peer-reviewed articles and 200 universities had been dropped at this point for the review. Figure 1 illustrates the PRISMA criteria employed for the paper.



**Fig 1:PRISMA flowchart of articles and records selected for the study**

As indicated on the flowchart, 8350 peer-reviewed articles were extracted and records of 200 universities were critically assessed. The review process considered reviewed papers, empirical papers, conceptual papers, conference papers, and opinion papers. To verify the quality and relevance of the papers included in the review, article abstracts underwent comprehensive scrutiny and filtration. Later, each research paper was carefully

examined, with 1037 publications being removed. 19 papers and other records were chosen after each article was assessed using the inclusion and exclusion criteria. At each level, the material included and eliminated is depicted in table 1.

**Table 1: Summary of reviewed articles on Preservice teacher's environmental education Curriculum.**

	Reference	Title	Study setting	Study design & Methods	Key findings related to the study
1	Mosothwane&Ndwapi (2012)	Training pre-service teachers in environmental education	Botswana	Mixed method	Pre-service teachers do not perceive themselves to be effective to teach EE, Teacher training colleges have not been successful in developing EE courses, there is urgent need for pre-service EE curriculum
2	Taylor, C. (1998)	Environmental Education in Primary Education: status and trends in southern and eastern Africa	Southern & Eastern Africa	Qualitative Comparative study	Inadequate provisions for EE in education policy, deficiencies in pre-service teacher training in EE, lack of instructional materials
3	Álvarez-García, O., Sureda-Negre, J., & Comas-Forgas, R. (2015)	Environmental education in pre-service teacher training: A literature review of existing evidence	Spain	Qualitative Systematic review	Lack of environmental competencies amongst pre-service teachers, gaps in the teacher training on EE
4	Tilbury, D. (1992).	Environmental Education within Pre-Service Teacher Education: The Priority of Priorities.	Gibraltar	Opinion paper	Inadequate provision of EE in pre-service teacher education
5	Yusup, F., Istiqamah, I., &Khairunnisa, K. (2021).	Learning Methods on Environmental Education to Improve Pre-Service Teachers' Environmental Literacy	Indonesia	Qualitative Systematic review	No special programme to prepare pre-service teachers for EE
6	Waktola, D. K. (2009).	Challenges and opportunities in mainstreaming environmental education into the curricula of teachers' colleges in Ethiopia	Ethiopia	Mixed method	Decline trend in the provision of EE in pre-service teacher training, inadequate levels of factual knowledge among teacher trainees
7	Almeida, S. C. (2015).	Environmental Education & Teacher Education.	India	Qualitative	Teacher educators unable to integrate EE into pre-service teachers' curriculum in their daily practices. Lack of motivation and incentives, there is lack of professional support for teacher educators.
8	Le Roux, C., &Maila, W. (2004).	Issues and challenges regarding environmental education policy implementation.	South Africa	Qualitative Case study	Lack of clarity on the status and relevance of EE, teacher educators do not have time to develop frame that support EE due to workload
9	Kassahun, D. (2007).	Challenges and Opportunities of Mainstreaming Environmental Education into the Curricula of Teachers' Colleges of	Ethiopia	Qualitative Case study	Inadequate levels of factual knowledge amongst pre-service teachers, variations in knowledge level and attitude on EE` curricular

		Ethiopia.			
10	Ogunyemi, B., & Ifegbesan, A. (2011).	Environmental literacy among pre-service social studies teachers: A review of the Nigerian experience	Nigeria	Quantitative	Teacher trainees lack of knowledge on EE issues,
11	Durrani, R., Malik, S., & Jumani, N. B. (2019).	Education for Sustainable Development (ESD) in Pre-Service Teachers Education Curriculum at Pakistan	Pakistan	Mixed method	Majority of B.Ed. courses not aligned with EE, lack of trained lecturers on EE
12	Yusup, F., Istiqamah, I., & Khairunnisa, K. (2021).	Learning Methods on Environmental Education to Improve Pre-Service Teachers' Environmental Literacy.	Spain	Qualitative Systematic review	No special programme to prepare pre-service teachers for EE
13	Ninomiya-Lim, S., Kang, J., Kim, C., & Abdullah, S. H. (2019).	Environmental Education in Higher Education Institutes in Asia- Overview of Experiences in South Korea, Malaysia, and Japan	South Korea, Malaysia, Japan	Qualitative Systematic review	Lack of qualified lecturer to integrate EE at the faculties. No standardised guideline for the integration of EE on campuses 1990s Japan established Institutes and facilities to promote EE practices and research at teacher training universities, Korea has establish EE courses in Universities to support the introduction of EE curriculum at the middle school, Master and PhD in EE programme started in the 1998 at national universities of education, Malaysia in 1991 integrated EE into national education system , EE is a compulsory subject for teacher trainees in Malaysia

The study searched for over 200 universities geographically located in Africa, Asia, and Europe. Inclusion criteria were based on:

1. Universities with faculty of Education
2. A four-year Bachelor of Education program
3. Availability of B.Ed. curriculum structure online

Most of the university websites visited were not have published records on their academic programs. Therefore, others were expunged from the criteria for lack of information to support our argument. Six top-notch universities were included in this systematic review.

**Table 2: Compulsory modules for a 4-year Bachelor of Education program**

University	Country	Year 1	Year 2	Year 3	Year 4
The University of Witwatersrand	South Africa	Education IA/ B, Literacy for Senior Phase and FET Teachers, Becoming a Teacher A AND B, Teaching Experience IA AND IB	Education II, Life Skills for Teachers, Teaching Experience II	Education III, Teaching Experience IIIA AND IIIB	Education IV, Being a Teacher IV, Teaching Experience IVA/ IVB
	South Africa	Education Studies 1A/B,	Education Studies 2A/Teaching Studies	Education Studies	Teaching Studies,

University of Johannesburg		Teaching Studies 1A/Teaching Methodology and Practicum 1A/B	2A/B,Teaching Methodology and Practicum 2A/B	2A/Teaching Studies 2A/B,	Methodology and Practicum
Stellenbosch University	South Africa	Teaching and Learning 178 / Practical Learning 177 / 179	Teaching and Learning 278 / Practical Learning 277	Teaching and Learning 378 / Practical Learning 377 Teaching and Learning 378 / Practical Learning 377	Teaching and Learning 478/488 Practical Learning 477/479
University of Pretoria	South Africa	Academic information management 111, academic information management 121, Literacies in education 110, Literacies in education 111 Literacies in education 120	Education 212, education 222 Teaching practice 280,	Education 312 Education 322 Teaching practice	Professional practice 471 Research project 461, Research project 464 Teaching practice
Rhodes University	South Africa	Education & Professional Studies 1A, Education & Professional Studies 1B Teaching Practice 1A	Performance and Multimodalities 1 Understanding the Social & Physical World 2 Education & Professional Studies 2 Teaching Practice 1B	Education & Professional Studies 3 Performance & Multimodalities 2 Understanding the Social & Physical World 3 Teaching Practice 2	Education & Professional Studies 4 Teaching Practice 3
University of South Africa (UNISA)	South Africa	Being a teacher, Africa in the world: Historical perspectives, Teacher as manager, Teaching practice I	Visual literacy, Arts and Ideology I, Becoming a Teacher, Basic Psychology,Personality Theories, Child and Adolescent Development, Teaching Practice II	Computer integration in the classroom, curriculum studies, inclusive education, instructional theories, Psychology of Education, Social Psychology, Teaching	Assessment in Education, Education studies, Environmental Education, Philosophy of Education, Research and critical reason ,South African education system, Sociology of



				Practice III	education, Teaching life orientation, Teaching practice IV
--	--	--	--	--------------	--

Many universities are running Bachelor of Education programs that are not in compliance with IEEP, and UNESCO-UNEP recommendations for the inclusion of EE into pre-service teachers' curricula. Most universities have failed to include EE as a compulsory module in pre-service teachers' curricula. From the above table, it is only UNISA that has made Environmental Education a compulsory module as part of teacher training and development. The main findings of the review are discussed below.

## RESULTS AND DISCUSSION

The main issues which emerged from pre-service teachers' environmental education training are discussed as follows:

### Lecturers for Environmental Education at Faculties of Education

The development of EE in colleges and Universities of education mainly depends on the availability of qualified EE lecturers. Almeida (2015) argued that teacher educators are not able to integrate EE content into pre-service teachers' curriculum in their daily practices. This has been a major setback hampering the growth and development of EE into the pre-service teacher's curriculum as espoused by IEEP, UNESCO-UNEP. This was corroborated by Durrani, Malik, & Jumani (2019) that, there are few lecturers with qualifications in EE in universities who are qualified to teach EE as a module. Many of the lecturers are not qualified to teach EE modules (Ninomiya-Lim, Kang, Kim, & Abdullah, 2019). Almeida (2015), further asserted, few teacher educators who have the wherewithal to integrate EE into pre-service teachers' curriculum are not motivated to do so due to a lack of professional support and incentives. These findings have demonstrated an existential issue that has exacerbated the failure of EE in the pre-service teachers' curriculum.

### Environmental Education Curriculum for Pre-service teachers

Le Roux and Maila (2004) indicated that there is a lack of clarity on the status and relevance of EE in the pre-service teacher's program. Besides that, the EE curriculum for pre-service teachers does not exist in most of the Universities with education facilities. Lecturers do not have sufficient time to develop frameworks that support EE due to their workload.

Mosothwane and Ndwapi (2012) discovered that colleges and universities of education have been unsuccessful in the development of EE courses, and this has thwarted the efforts of training environmentally literate teachers for a sustainable future. Six universities with faculties of Education curriculum structure were reviewed systematically. It emerged that most of the top-ranking universities in the world have failed woefully to integrate EE as a module in their curriculum structure. According to the review, it is only the University of South Africa (UNISA) that has introduced EE as a compulsory module for all pre-service teachers enrolled in their four-year Bachelor of Education degree program. Mosothwane and Ndwapi (2012) further argued that there is an urgent need for pre-service teachers' EE curriculum. It was revealed that many Bachelors of Education Courses are not aligned with EE (Durrani, R., Malik, & Jumani, 2019). This was supported by Yusup, Istiqamah, and Khairunnisa, (2021), most universities have no special EE program.

According to Ninomiya-Lim, Kang, Kim, and Abdullah (2019), the trajectory of EE teacher training programs in some Asia countries is phenomenal. In early 1990 as Japan established institutions and facilities to promote EE practices and research at teacher training universities. This development was emulated by South Korea through the establishment of EE courses at the national universities to support the teaching and learning of EE in middle school. Master and Doctoral programs were introduced in 1998 to equip EE lecturers (teacher educators). In the 1990s Malaysia integrated EE into the national education system which propelled the introduction of EE as a compulsory subject for all pre-service teachers. These efforts are commendable toward the achievement of Education for sustainable development goals. However, the evidence on the face of this review in table 2 paints a gloomy picture of the growth and development of EE curriculum in most African Universities. Tilbury (1992) stressed that there are inadequate provisions made for the integration of EE in teacher education. The situation has not changed over three decades since this pronouncement because Waktola (2009) intimated that there is a decline trend in the provision of EE in pre-service teacher training in colleges and universities. These shreds of evidence vindicate the many silent voices of in-service teachers who are struggling to integrate EE into their daily teaching and learning in the classroom.

### **Environmental Education framework for colleges and Universities**

An environmental education curriculum for pre-service teachers should focus on equipping them with the necessary knowledge, skills, and attitudes to effectively teach their future students about the environment and sustainability (Boubonari et al., 2013). Here is an outline of some topics and concepts that could be covered in such a curriculum:

1. Understanding the natural world: Pre-service teachers should have a solid understanding of basic ecological principles, such as energy flow, nutrient cycling, and the interconnectedness of ecosystems. They should also learn about the major biomes and their unique characteristics.
2. Environmental issues and challenges: Pre-service teachers should be aware of the major environmental challenges facing our planet, such as climate change, habitat loss, and pollution. They should understand the causes and impacts of these issues, as well as possible solutions.
3. Sustainability: Pre-service teachers should learn about the concept of sustainability and how it applies to our society and economy. They should understand the three pillars of sustainability: environmental, social, and economic, and how they are interconnected.
4. Environmental education methods and strategies: Pre-service teachers should be introduced to a variety of methods and strategies for teaching about the environment, such as hands-on activities, project-based learning, and field trips. They should also learn how to integrate environmental education into their core curriculum.
5. Environmental literacy and citizenship: Pre-service teachers should understand the importance of environmental literacy and citizenship, and how they can encourage their students to become responsible and engaged citizens. They should also learn about the role of environmental education in promoting social justice and equity.
6. Resources and networks: Pre-service teachers should be introduced to a variety of resources and networks that can support their teaching of environmental education. This could include organizations, websites, and other materials.

Overall, an environmental education curriculum for pre-service teachers should aim to provide a solid foundation of knowledge and skills that will enable them to effectively teach their future students about the environment and sustainability (Sümen&Çalisici, 2016).

An educational framework is a set of standards that specifies the content to be learned and taught. The framework for EE defines and establish the parameters of the content required to build environmentally literate pre-service teacher. Yusup, Istiqamah, and Khairunnisa (2021) alluded that, there is a lack of well-thought EE programs at the various teacher training universities. This was ably supported by Durrani, R., Malik, S., & Jumani, N. B. (2019) who posited that B.Ed. programs for pre-service teachers are not EE-compatible. The evidence was seen on the face of the review of six universities in South Africa. It was discovered that the best universities in South Africa were not having an EE curriculum framework for pre-service teacher training. It emerged that only UNISA has EE as a core module for all their Bachelor of Education qualifications (UNISA Bachelor of education modules, 2022). Taylor (1998) concluded that there are deficiencies in pre-service EE teachers' training curriculum. Though the review process could not be perused through the B.Ed. the curriculum of most of the teacher training universities due to the unavailability of information. However, it is believed that the trend of non-compliance will not change in other institutions of education since the universities captured in the review analysis are classified as the best universities in Sub-Saharan Africa.

### **Status of Pre-service teachers' Environmental knowledge**

There have been various studies that have explored the environmental knowledge of pre-service teachers, with mixed results. Some studies have suggested that pre-service teachers may not have sufficient knowledge about environmental issues and sustainability, and may not feel confident in teaching these topics to their future students. A study by Liu, Chen, and Sun (2020) found that pre-service teachers in China had relatively low levels of environmental knowledge and lacked confidence in their ability to teach environmental education.

Boz and Yaman (2018) intimated that in Turkey pre-service teachers had relatively high levels of environmental knowledge, although they noted that this knowledge was not always reflected in their behaviours and practices. Overall, it seems that there is a need for ongoing efforts to improve the environmental knowledge of pre-service teachers and to provide them with the skills and resources necessary to effectively teach environmental education in their future classrooms. Goulgouti et al. (2019) argued in their study that the preservice teachers' overall environmental knowledge was low. The study found that pre-service teachers had the most knowledge about waste management, but lacked knowledge in areas such as climate change, renewable energy sources, and environmental policies.

Ogunyemi and Ifegbesan (2011) argued that pre-service teachers in colleges and universities of education in Nigeria are not exposed to EE concepts and methodologies. Teachers' trainees lack knowledge of contemporary EE issues. Kassahun (2007) findings from a study conducted in Ethiopia colleges of education, substantiated the views of Ogunyemi and Ifegbesan. It emerged from the review that pre-service teachers have inadequate levels

of factual knowledge on EE-related issues. There are variations in knowledge level and attitude toward EE curricula (Waktola, 2009). A study conducted in Botswana established that pre-service teachers do not perceive themselves as emerging teachers who are effective and competent to teach EE (Mosothwane&Ndwapu, 2012).

### CONCLUSION AND RECOMMENDATION

The purpose of this study was to trace the development of EE in pre-service teachers' curricula. We were inspired to carry out this systematic study because we firmly believe in the importance of teacher preparation in advancing education for sustainable development. Teacher educators are unable to include EE content in pre-service teachers' daily lesson plans. There aren't many university teachers who are competent to teach EE as a module. The position and importance of EE are not clearly defined in the pre-service teacher preparation curriculum. Additionally, most universities with educational faculties have no EE curriculum for pre-service teachers. The many universities that offer teacher education don't have well-designed EE programs. The current state of environmental concerns is not well known to prospective teachers. These discoveries have brought the failures and disparities in training pre-service teachers in environmental education to the limelight. Based on the findings, the study recommended that universities and colleges.

- faculty and staff at universities and colleges should be proficient in EE methodologies and curriculum development and capable of teaching prospective teachers.
- integrate EE as a mandatory module for pre-service teachers irrespective of their area of specialty. This will ensure that all teachers are well-equipped and prepared to teach EE content in the classroom.
- organize seminars, workshops, and conferences for teacher educators on EE.
- Develop curriculum framework and policy document to facilitate teaching and learning of EE modules. Policy documents should spell out how teachers educators infuse EE content into their daily practices.

In summary, incorporating environmental education into teacher education is essential for creating a generation of environmentally conscious and responsible citizens. By providing future teachers with the necessary knowledge and skills, we can ensure that environmental education is integrated into the curriculum and effectively taught to students.

### REFERENCES

1. Ante, M. E. A. (2019). Level of Competence of Environmental Education Concepts and Principles of Students from the National Network of Normal Schools (3NS). *Bicol University R & D Journal*, 22(2). <https://filepdf.org/document/yr3dw7jp-competence-environmental-education-concepts-principles-students-national-network.html>.
2. Álvarez-García, O., Sureda-Negre, J., & Comas-Forgas, R. (2015). Environmental education in pre-service teacher training: A literature review of existing evidence. *Journal of Teacher Education for Sustainability*, 17(1), 72-85. <https://eric.ed.gov/?id=EJ1108120>
3. Almeida, S. C. (2015). Environmental Education & Teacher Education. *Environmental Education in a Climate of Reform*, 11-42. [https://doi.org/10.1007/978-94-6300-217-2\\_2](https://doi.org/10.1007/978-94-6300-217-2_2)
4. Brusseau, M. L., Ramirez-Andreotta, M., Pepper, I. L., & Maximillian, J. (2019). Environmental impacts on human health and well-being. In *Environmental and pollution science* (pp. 477-499). Academic Press. <https://doi.org/10.1016/B978-0-12-814719-1.00026-4>
5. Agbedahin, A. V. (2019). Sustainable development, Education for Sustainable Development, and the 2030 Agenda for Sustainable Development: Emergence, efficacy, eminence, and future. *Sustainable Development*, 27(4), 669-680. <https://doi.org/10.1002/sd.1931>
6. Brady, E. (2019). Aesthetics of the natural environment. *Edinburgh university press*. <https://philpapers.org/rec/BRAAOT>
7. Boubonari, T., Markos, A., & Kevrekidis, T. (2013). Greek pre-service teachers' knowledge, attitudes, and environmental behavior toward marine pollution. *The Journal of Environmental Education*, 44(4), 232-251.
8. Catling, S. (2014). Pre-service primary teachers' knowledge and understanding of geography and its teaching: A review. *Review of International Geographical Education Online*, 4(3), 235-260. <https://files.eric.ed.gov/fulltext/EJ1158071.pdf>
9. Dada, D. O., Eames, C., & Calder, N. (2017). Impact of environmental education on beginning preservice teachers' environmental literacy. *Australian Journal of Environmental Education*, 33(3), 201-222. <https://doi.org/10.1017/aee.2017.27>
10. Damoah, B., & Adu, E. O. (2019). Challenges teachers face in the integration of Environmental Education into the South African curriculum. *American Journal of Humanities and Social Science Research (IJHSSR)*, 3(10), 157-166.

11. Damoah, B., &Adu, E. O. (2020). Teacher's awareness of the integrated environmental education curriculum in South Africa. *e-BANGI*, 17(6), 280-295.
12. Damoah, B., &Omodan, B. I. (2022). Determinants of effective environmental education policy in South African schools. *International Journal of Educational Research Open*, 3, 100206.<https://doi.org/10.1016/j.ijedro.2022.100206>
13. Durrani, R., Malik, S., &Jumani, N. B. (2019). Education for Sustainable Development (ESD) in Pre-Service Teachers Education Curriculum at Pakistan: Current Status and Future Directions. *Pakistan Journal of Distance and Online Learning*, 5(2), 67-84.[https://www.semanticscholar.org/paper/Education-for-Sustainable-Development-\(ESD\)-in-at-Durrani-Malik/6da01a37aa4cf10b5ff54fc9f3d614fb1b00fada](https://www.semanticscholar.org/paper/Education-for-Sustainable-Development-(ESD)-in-at-Durrani-Malik/6da01a37aa4cf10b5ff54fc9f3d614fb1b00fada)
14. Franzen, R. L. (2018). Environmental education in teacher education programs: Incorporation and use of professional guidelines. *Journal of Sustainability Education*, 16, 1-18.
15. Mosothwane, M., &Ndwapi, G. (2012). Training pre-service teachers in environmental education: The case of colleges of education in Botswana. *International Journal of Scientific Research in Education*, 5(1), 26-37.<http://hdl.handle.net/10311/1038>
16. Nagra, V. (2010). Environmental education awareness among schoolteachers. *The Environmentalist*, 30(2), 153-162.<https://doi.org/10.1007/s10669-010-9257-x>
17. Potter, G. (2009). Environmental education for the 21st century: Where do we go now?. *The Journal of Environmental Education*, 41(1), 22-33.
18. Rhodes University(n.d.). Faculty of Education: Bachelor of Education Foundation Phase Teaching.<https://www.ru.ac.za/education/studying/bed/>
19. Shamseer, L., Moher, D., Clarke, M., Ghersi, D., Liberati, A., Petticrew, M., ... & Stewart, L. A. (2015). Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) 2015: elaboration and explanation. *Bmj*, 349.<https://doi.org/10.1136/bmj.g7647>
20. Sinha, S. (1985). Environmental Education: Module for Pre-Service Training of Social Science Teachers and Supervisors for Secondary Schools. *Environmental Educational Series* 9.<https://unesdoc.unesco.org/ark:/48223/pf0000065036>
21. Stellenbosch University(n.d.). Faculty of Education
22. <http://www.sun.ac.za/english/Documents/Yearbooks/Current/Education.pdf>
23. Sukma, E., Ramadhan, S., &Indriyani, V. (2020). Integration of environmental education in elementary schools. In *Journal of Physics: Conference Series* (Vol. 1481, No. 1, p. 012136). IOP Publishing.
24. Le Roux, C., &Maila, W. (2004). Issues and challenges regarding environmental education policy implementation. <https://doi.org/10.1080/18146620408566282>
25. Kassahun, D. (2007). Challenges and Opportunities of Mainstreaming Environmental Education into the Curricula of Teachers' Colleges of Ethiopia. *The Ethiopian Journal of Education*, 27(2), 1-24.<http://ejol.ethernet.edu.et/index.php/EJE/article/view/138>
26. Ogunyemi, B., &Ifegbesan, A. (2011). Environmental literacy among pre-service social studies teachers: A review of the Nigerian experience. *Applied Environmental Education & Communication*, 10(1), 7-19. <https://doi.org/10.1080/1533015X.2011.549795>
27. Oulton, C. R., & Scott, W. A. (1995). The 'Environmentally Educated Teacher': an exploration of the implications of UNESCO UNEP's ideas for pre-service teacher education programmes. *Environmental Education Research*, 1(2), 213-231. <https://doi.org/10.1080/1350462950010207>
28. Nadakavukaren, A., &Caravanos, J. (2020). Our global environment: A health perspective. *Waveland Press*.<https://www.vitalsource.com/products/our-global-environment-a-health-perspective-anne-nadakavukaren-jack-v9781478640264>
29. Namunga, N. W., &Otunga, R. N. (2012). Teacher education as a driver for sustainable development in Kenya. *International journal of humanities and social science*, 2(5), 228-234.<https://kerd.ku.ac.ke/handle/123456789/656>
30. Guven, G., &Sulun, Y. (2017). Pre-service teachers' knowledge and awareness about renewable energy. *Renewable and Sustainable Energy Reviews*, 80, 663-668.DOI: 10.1016/j.rser.2017.05.286

31. Goulgouti, A., Plakitsi, A., & Stylos, G. (2019). Environmental literacy: Evaluating knowledge, affect, and behavior of pre-service teachers in Greece. *Interdisciplinary Journal of Environmental and Science Education*, 15(1), e02202.
32. Kasanda, C. D. (2009). The status of environmental education in Namibia: Issues and Challenges. *Environmental Education in Context*, 149-155. DOI: [https://doi.org/10.1163/9789087909635\\_015](https://doi.org/10.1163/9789087909635_015)
33. Kinslow, A. T., Sadler, T. D., & Nguyen, H. T. (2019). Socio-scientific reasoning and environmental literacy in a field-based ecology class. *Environmental Education Research*, 25(3), 388-410. <https://doi.org/10.1080/13504622.2018.1442418>
34. Lane, J. F. (2006). Environmental education implementation in Wisconsin: Conceptualizations and practices. The University of Wisconsin-Madison. <https://www3.uwsp.edu/cnr-ap/wcee/Documents/JennieLaneDissertation.pdf>
35. McKeown-Ice, R. (2000). Environmental education in the United States: A survey of preservice teacher education programs. *The Journal of Environmental Education*, 32(1), 4-11. <https://doi.org/10.1080/00958960009598666>
36. Ninomiya-Lim, S., Kang, J., Kim, C., & Abdullah, S. H. (2019). Environmental Education in Higher Education Institutes in Asia-Overview of Experiences in South Korea, Malaysia, and Japan. *Japanese Journal of Environmental Education*, 28(4), 4\_36-43. DOI: 10.5647/jsoee.28.4\_36
37. Nordhaus, W. (2019). Climate change: The ultimate challenge for economics. *American Economic Review*, 109(6), 1991-2014. <https://doi.org/10.1257/aer.109.6.1991>
38. Richter, B. W., & De Sousa, L. O. (2019). The implementation of environmental education to promote sustainability: An overview of the processes and challenges. *International Journal of Sustainable Development & World Ecology*, 26(8), 721-731. <https://doi.org/10.1080/13504509.2019.1672220>
39. Taylor, C. (1998). Environmental education in primary education: Status and trends in southern and eastern Africa. *Environmental Education Research*, 4(2), 201-215.
40. Türkoğlu, B. (2019). Opinions of preschool teachers and pre-service teachers on environmental education and environmental awareness for sustainable development in the preschool period. *Sustainability*, 11(18), 4925. <https://doi.org/10.3390/su11184925>
41. Tilbury, D. (1992). Environmental Education within Pre-Service Teacher Education: The Priority of Priorities. *International Journal of Environmental Education and Information*, 11(4), 267-80. <https://eric.ed.gov/?id=EJ466060>
42. Yusup, F., Istiqamah, I., & Khairunnisa, K. (2021). Learning Methods on Environmental Education to Improve Pre-Service Teachers' Environmental Literacy. *Journal Of Biology Education Research (JBER)*, 2(2), 50-55.
43. University of Johannesburg (n.d.). Faculty of Education. <https://www.uj.ac.za/wp-content/uploads/2021/10/faculty-of-education-rules-and-regulations.pdf>
44. University of South Africa (n.d.). UNISA Bachelor of education modules (2022, October 10). [https://www.unisa.ac.za/sites/corporate/default/Register-to-study-through-Unisa/Undergraduate-&-honours-qualifications/Find-your-qualification-&-choose-your-modules/All-qualifications/Bachelor-of-Education-in-Senior-Phase-and-Further-Education-and-Training-Teaching-School-subject-combination:--Art-and-Life-Orientation-\(90104---ARP\)](https://www.unisa.ac.za/sites/corporate/default/Register-to-study-through-Unisa/Undergraduate-&-honours-qualifications/Find-your-qualification-&-choose-your-modules/All-qualifications/Bachelor-of-Education-in-Senior-Phase-and-Further-Education-and-Training-Teaching-School-subject-combination:--Art-and-Life-Orientation-(90104---ARP))
45. Waktola, D. K. (2009). Challenges and opportunities in mainstreaming environmental education into the curricula of teachers' colleges in Ethiopia. *Environmental Education Research*, 15(5), 589-605. <https://doi.org/10.1080/13504620903151024>