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ASSESSMENT OF STUDENTS AWARENESS OF GLOCAL SUSTAINABILITY CHALLENGES IN HIGH SCHOOLS

ОЦІНЮВАННЯ ОБІЗНАНОСТІ УЧНІВ ЩОДО ГЛОБАЛЬНИХ ВИКЛИКІВ СТАЛОГО РОЗВИТКУ У СТАРШИХ КЛАСАХ

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ABSTRACT

Sustainability education has become increasingly important in preparing young people to respond to interconnected global and local environmental challenges. Schools play a critical role in shaping students' understanding of sustainable development and their capacity to act responsibly within their communities.

Освіта у сфері сталого розвитку стає дедалі важливішою у підготовці молоді до реагування на взаємопов'язані глобальні та місцеві екологічні проблеми. Школи відіграють вирішальну роль у формуванні розуміння учнями сталого розвитку та їхньої здатності діяти відповідально у своїх громадах.

Purpose. *This study assessed high school students' awareness of glocal sustainability challenges, focusing on their knowledge of sustainability concepts, principles, and issues as well as their ability to link global phenomena with local realities.*

Methodology. *The research used a descriptive survey design involving 177 undergraduates from the University of Johannesburg, South Africa. Data were analyzed using descriptive statistics.*

Results. *Results showed that students had a strong conceptual awareness of sustainability principles, including equal access to education, gender equality, human rights, biodiversity conservation, and responsible corporate behavior. Over 90% recognized the importance of education, peace, and environmental stewardship for sustainable development, and most were aware of global challenges such as climate change, waste management, and resource equity. However, the study found a gap between students' theoretical knowledge and practical local action, particularly in areas like water conservation and disaster preparedness.*

Conclusion. *The findings suggest that while students understand sustainability conceptually, their learning remains abstract. The study recommends more experiential, context-based learning, improved teacher training, and stronger school-community partnerships to better integrate global sustainability ideas with local practices.*

Keywords: *environmental awareness, experiential learning, global sustainability, sustainable development education, theory-practice gap.*

Мета. *Це дослідження оцінило обізнаність учнів старших класів щодо глобальних викликів сталого розвитку, зосереджуючись на їхніх знаннях концепцій, принципів та проблем сталого розвитку, а також на їхній здатності пов'язувати глобальні явища з місцевими реаліями.*

Методологія. *У дослідженні використовувався описовий дизайн опитування, в якому взяли участь 177 колишніх учнів шкіл, а зараз студентів Йоганнесбурзького університету, Південна Африка. Дані були проаналізовані за допомогою описової статистики.*

Результати. *Результати показали, що учні мали сильне концептуальне усвідомлення принципів сталого розвитку, включаючи рівний доступ до освіти, гендерну рівність, права людини, збереження біорізноманіття та відповідальну корпоративну поведінку. Понад 90% визнали важливість освіти, миру та екологічного управління для сталого розвитку, і більшість була обізнана з глобальними викликами, такими як зміна клімату, управління відходами та рівність ресурсів. Однак, дослідження виявило розрив між теоретичними знаннями та практичними діями на місцевому рівні, особливо в таких сферах, як збереження водних ресурсів та готовність до стихійних лих.*

Висновки. *Результати дослідження свідчать про те, що хоча учні розуміють сталий розвиток концептуально, їхнє навчання залишається абстрактним. Дослідження рекомендує більше емпіричного, контекстно-орієнтованого навчання, покращення підготовки вчителів та зміцнення партнерства між школою та громадою для кращої інтеграції ідей глобального сталого розвитку з місцевими практиками.*

Ключові слова: *екологічна свідомість, експериментальне навчання, глобальна сталість, освіта для сталого розвитку, розрив між теорією і практикою.*

INTRODUCTION

Sustainability has become a topical subject and pedagogical concern in recent times because its environmental, social and economic dimensions are highly interconnected and time sensitive. While conventional discussions often treat sustainability at a global scale focusing on planetary boundaries, climate change, biodiversity loss and the Sustainable Development Goals (SDGs) these global dynamics are always experienced through local realities such as community water shortages, waste management practices, urban heat islands, and livelihood shocks (Tshabalala et al., 2025; Azeez et al., 2024). The term glocal sustainability therefore captures the twofold insight that global drivers set the stage for broad risks and responsibilities, and local contexts shape how those risks appear, are felt and can be tackled in practice. This glocal lens invites learners

to trace linkages between large-scale drivers (for example, greenhouse-gas emissions or trade patterns) and proximate problems in their towns, neighbourhoods and schools, enabling more relevant, actionable learning.

Education systems are uniquely positioned to translate glocal complexity into informed civic capacity. High school learning is a formative stage where students develop critical thinking, civic identities and practical skills; it is therefore an opportunity to cultivate sustainability literacies that span systems thinking, local stewardship and collective action (Parayiwa & Shabalala, 2025; Mashaba et al., 2022). Empirical studies across southern Africa show that experiential, project-based and community-linked approaches (school gardening, recycling drives, participatory mapping) produce stronger commitments to local environmental practices than classroom-only instruction, because they help students make concrete links between abstract ideas (such as ‘‘carbon’’ or ‘‘resilience’’) and everyday behaviours (Mbokazi et al., 2021; Parayiwa & Shabalala, 2025). Moreover, regional policy frameworks (e.g., SADC/UNESCO strategic guidance on Education for Sustainable Development) explicitly call for curricula that integrate local knowledge and multilingual, context-sensitive pedagogies to deepen relevance and inclusion.

Despite these policy commitments and series of successful programming, recent research suggests many students still hold limited or fragmented understandings of sustainability particularly when it comes to linking global phenomena to local causes and solutions. Large-scale analyses of climate change consciousness across African populations indicate that educational attainment, media access and geo-demographic factors strongly shape awareness, and that overall consciousness remains uneven across regions and social groups (Azeez et al., 2024; Zickafoose et al., 2024). School studies find a common pattern: students can often name environmental problems and SDG terms, yet lack depth in systems reasoning for example how local water use connects to watershed health and in translating knowledge into sustained local action (Padilla et al., 2025; Mbokazi et al., 2021). This fragmented learning reduces the potential of schooling to produce the type of civic agency and problem-solving habit that glocal sustainability requires.

There are several likely explanations for these gaps. First, curriculum and teacher preparation sometimes emphasise facts and definitions rather than inquiry-based, interdisciplinary learning that fosters systems thinking (Zickafoose et al., 2024; Mashaba et al., 2022). Second, inequalities in school resources and infrastructure including limited access to experiential learning tools, school-level electricity, and green spaces constrain opportunities for applied learning in many contexts (Zickafoose et al., 2024). Third, public information ecosystems matter: Afrobarometer-based analyses show that radio and local media remain dominant information channels in many African contexts, and that differential media access produces uneven exposure to climate and sustainability messaging (Azeez et al., 2024). Finally, teachers themselves often report needing more professional development in linking global frameworks like the SDGs to local curricular activities and community projects (Ekpoto et al., 2025; Parayiwa & Shabalala, 2025).

Given this background, there is an urgent need to assess students’ awareness of glocal sustainability challenges specifically in secondary schools. A focused assessment accomplishes three goals: it diagnoses which dimensions of glocal understanding are weak (knowledge, systems thinking, local action orientation), it identifies socio-demographic and schooling factors associated with stronger or weaker awareness, and it yields practical recommendations for curriculum redesign, teacher development, and

community partnerships that can bridge the global–local gap (Tshabalala et al., 2025; Mbokazi et al., 2021; UNESCO, ESD for 2030). This study aims to measure the depth and breadth of high-school students' glocal sustainability awareness and to map how that awareness correlates with school practices, teacher support and local information sources laying the groundwork for targeted pedagogical interventions that make sustainability education both meaningful and actionable.

Sustainability education in secondary schools is no longer an option but a necessity. Schools occupy a strategic position for shaping the knowledge, values and skills of young people who will inherit and act on the environmental and socio-economic consequences of today's decisions (Tshabalala et al., 2025; Parayiwa & Shabalala, 2025). By introducing learners to systems thinking, local stewardship, climate literacy and participatory problem-solving during the high-school years, educators can help build both the cognitive foundations and the civic dispositions required for lifelong sustainable practices and community resilience (Tshabalala et al., 2025; Mbokazi et al., 2021). Moreover, secondary schooling often coincides with adolescents forming civic identities and career interests; when sustainability is taught in ways that are experiential, local-ised and relevant, students are more likely to translate knowledge into action (Parayiwa & Shabalala, 2025; Mashaba et al., 2022).

There are several pragmatic reasons to prioritise sustainability education at the high-school level. First, empirical analyses across African contexts show that educational attainment is among the strongest predictors of climate and sustainability consciousness implying that improving secondary education content and access can lift community awareness broadly (Azeez et al., 2024). Second, high schools are ideal sites for applied learning such as school gardens, recycling and community mapping that link global phenomena (e.g., greenhouse-gas growth; biodiversity loss) to immediate, local manifestations (water scarcity, waste mismanagement, urban heat) a "glocal" pedagogical stance that increases relevance and agency (Tshabalala et al., 2025; Parayiwa & Shabalala, 2025). Third, regional policy frameworks and initiatives (including UNESCO's Education for Sustainable Development and continental youth-focused strategies) emphasise secondary education as a leverage point for reaching SDG targets and building green skills for Africa's young population (UNESCO, ESD for 2030; AfDB/continental youth papers). Together, these reasons argue for systematic reinforcement of sustainability across secondary curricula, teacher training and school–community partnerships.

Despite the clear importance of high-school sustainability education, recent research points to a worrying pattern of limited, uneven or fragmented student understanding of sustainability concepts and glocal linkages. Large-scale studies using Afrobarometer and national survey data report generally low to uneven climate-change consciousness across populations, with information channels (radio, local media), education level and urban–rural location shaping awareness differentially (Azeez et al., 2024). School-level research similarly finds that while many students can name environmental problems or SDG labels, they often lack depth in systems reasoning (for instance, how upstream land use affects local water quality) and struggle to translate classroom facts into sustained local action (Mbokazi et al., 2021; Mashaba et al., 2022). These findings suggest that familiarity with terms does not equate to a coherent, actionable understanding of glocal sustainability challenges.

A number of structural and pedagogical factors help explain this fragmentation. Curriculum designs that favour fact-memorisation over inquiry, inadequate pre- and in-

service teacher preparation for Education for Sustainable Development (ESD), and stark inequalities in school resources (lack of outdoor learning spaces, limited teaching materials, and intermittent electricity or internet in some schools) all constrain the depth and quality of sustainability learning (Ekpoto et al., 2025; Mhlongo et al., 2023; UNESCO analyses). Language and some other associated barriers where instruction is delivered in languages unfamiliar to learners also weaken the translation of scientific or global frameworks into locally intelligible actions (recent work on multilingual ESD in sub-Saharan Africa). Together, these constraints produce patchy learning outcomes: pockets of strong, practice-oriented awareness exist alongside large swaths of superficial or fragmented understanding.

Given these gaps, there is an urgent need for focused assessments of glocal sustainability awareness at the secondary level. Such an assessment should move beyond simple recall of facts and measure the breadth (knowledge of global and local issues), depth (systems reasoning), and orientation to action (intentions and participation in local sustainability practices) among students. Mapping which competencies are weak, and how they vary by socio-demographic and school-resource variables, can directly inform curriculum revisions, teacher professional development, and school–community interventions that aim to convert isolated knowledge into sustained, context-sensitive action (Mbokazi et al., 2021; Tshabalala et al., 2025; Parayiwa & Shabalala, 2025). This study responds to that need by assessing high-school students' awareness of glocal sustainability challenges and by identifying school and community correlates of stronger glocal understanding.

STATEMENT OF THE PROBLEM

Sustainability education is widely recognised as essential for preparing young people to respond to the complex environmental, social, and economic challenges of the 21st century. At the high school level, it offers a unique opportunity to equip learners with the knowledge, skills, and values necessary for both local action and global engagement (Tshabalala, Lunga, & Baloyi, 2025; Sterling, 2022). The "glocal" approach bridging global sustainability frameworks with local realities has been proposed as a powerful way to make sustainability learning more relevant and actionable. Despite this potential, evidence suggests that many high school students possess only limited or fragmented awareness of sustainability issues. In African contexts, while students may be able to name environmental problems or refer to the Sustainable Development Goals (SDGs), they often lack the systems thinking needed to understand the interconnections between global phenomena and their local impacts (Mbokazi et al., 2021).

Similarly, studies in other regions show that sustainability education often remains fact-based and siloed, with insufficient emphasis on interdisciplinary learning and real-world application (Biasutti & Frate, 2017). Several factors contribute to this gap. Curriculum designs may prioritise discrete subject knowledge over holistic sustainability competencies; teacher training in Education for Sustainable Development (ESD) is often inadequate; and disparities in school resources limit opportunities for experiential, project-based learning (UNESCO, 2020). As a result, students' understanding tends to be shallow, fragmented, and disconnected from practical action undermining the transformative potential of sustainability education.

This persistent gap between the intended outcomes of sustainability education and actual student awareness underscores the need for empirical assessments of high school students' understanding of glocal sustainability challenges. Without such

evidence, efforts to reform curricula, strengthen teacher training, and design relevant learning experiences risk being misaligned with learners' actual needs.

This study **aims** to address this gap by systematically evaluating students' awareness, thereby providing data to inform targeted educational interventions that foster informed, context-sensitive, and action-oriented sustainability competencies. The research is guided by the following objectives:

1. To evaluate students' knowledge and understanding of sustainability concepts, principles, and issues.
2. To determine the extent to which students are aware of global, national, and local sustainability challenges.

Research questions

1. What is the level of students' knowledge and understanding of sustainability concepts, principles, and issues?
2. To what extent are students aware of the global, national, and local sustainability challenges?

THEORETICAL FRAMEWORK

The study was hinged on Sustainable development theory. Sustainable development theory provides a fundamental lens for understanding how education can contribute to addressing pressing global and local sustainability challenges. The theory is rooted in the landmark 1987 Brundtland Commission Report, which defined sustainable development as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (World Commission on Environment and Development WCED, 1987). This concept highlights the importance of balancing economic growth, environmental protection, and social equity. In the context of high school education, sustainable development theory emphasizes the role of knowledge, values, and skills in shaping students' awareness of issues that cut across global concerns such as climate change, biodiversity loss, and resource depletion, and local challenges like waste management, deforestation, or water scarcity (UNESCO, 2017). The theory suggests that young people must be empowered through education to understand, internalize, and respond proactively to these interconnected challenges.

One of the central dimensions of sustainable development theory is its holistic and integrative approach. It rejects the treatment of environmental, economic, and social issues in isolation, stressing instead that sustainability requires an interdisciplinary understanding of how these domains interact (Hopwood et al., 2005). When applied to high schools, this theoretical orientation implies that awareness of glocal sustainability challenges cannot be cultivated through fragmented subject teaching alone but must be integrated across curricula, co-curricular activities, and institutional practices (Sterling, 2010). Students' awareness, therefore, is seen as an outcome of both formal and informal educational experiences that shape their capacity to think critically and act responsibly. This aligns with UNESCO's call for Education for Sustainable Development (ESD), which is grounded in sustainable development theory and positions students as active participants in building a more sustainable future (UNESCO, 2020).

Furthermore, sustainable development theory underscores the concept of intergenerational equity, which is highly relevant to high school education. Students, as the next generation of decision-makers, will inherit both the benefits and the burdens

of current global and local sustainability practices. Raising their awareness of these issues is not just an educational goal but a moral responsibility to equip them with the competencies necessary for sustainable living (Tilbury, 2011). This principle situates high school students at the heart of sustainability discourse, as their awareness and attitudes will significantly influence future societal choices. The theoretical framework thus provides justification for assessing students' awareness, since understanding the level of their knowledge and perception is crucial for evaluating how effectively schools are contributing to sustainable development goals.

Another core tenet of the theory is the concept of glocalism, which refers to the interplay between global issues and local contexts. Sustainable development theory recognizes that while sustainability challenges are global in scope, their manifestations and solutions are often context-specific (Robertson, 1995). For instance, global warming is a planetary concern, but its impact may be felt locally through irregular rainfall patterns or food insecurity. By adopting a glocal perspective, the theory affirms that awareness among high school students should not be limited to abstract global narratives but should connect with their immediate realities (Yli-Panula et al., 2020). This glocal framing ensures that students are able to link the larger global sustainability agenda with their local environments, thereby fostering relevance and engagement. Thus, the assessment of students' awareness becomes a practical step to examine how well they are making these connections.

Moreover, sustainable development theory stresses the importance of participatory learning and transformative education. It emphasizes that awareness is not merely about acquiring information but also about fostering critical thinking, problem-solving, and collaborative action (Sterling, 2010; Tilbury, 2011). In high school contexts, this translates into encouraging students to not only understand sustainability issues but also to engage in practices that reflect sustainable living, such as recycling, energy conservation, and community-based environmental projects. From this perspective, the theory provides a basis for assessing awareness not just in terms of cognitive knowledge but also affective and behavioral dimensions. Evaluating students' awareness of glocal sustainability challenges, therefore, becomes a way of assessing the transformative potential of education in shaping sustainable mindsets and behaviors.

Sustainable development theory is also relevant for its alignment with global policy frameworks such as the United Nations Sustainable Development Goals (SDGs). SDG 4 specifically emphasizes "quality education," with a sub-target focusing on education for sustainable development (UN, 2015). This global agenda reinforces the theoretical link between sustainable development and high school education, underscoring that students' awareness of sustainability challenges is a recognized international priority. By situating the study within this framework, the research draws on a robust theoretical foundation that is not only academically significant but also globally relevant. The theory thus legitimizes the importance of assessing students' awareness as a way of gauging progress toward achieving the broader sustainable development agenda.

Finally, the relevance of sustainable development theory to this research lies in its normative orientation: it does not simply describe what is, but prescribes what ought to be. It provides a guiding vision for education to move beyond traditional knowledge transmission toward fostering competencies for sustainable living (Hopwood et al., 2005). This makes it an appropriate framework for a study that seeks to assess students' awareness of sustainability challenges, since such assessment is a step toward aligning educational practice with the aspirations of sustainable development. The theory

ultimately frames high school students not as passive learners but as critical stakeholders in advancing sustainability, making their awareness an indispensable foundation for addressing both global and local challenges.

LITERATURE REVIEW

Origins and evolution of Education for Sustainable Development (ESD)

Education for Sustainable Development (ESD) emerged from the longer arc of environmental education but expanded its scope to integrate social justice, cultural diversity, and economic wellbeing with ecological integrity. Contemporary syntheses trace this evolution from early environmental education problem-awareness toward a transformative, competency-based paradigm that equips learners to think systemically, anticipate futures, collaborate, and act for change (UNESCO, 2020). A major accelerator was the United Nations Decade of ESD (2005–2014) and its successor, the Global Action Programme (2015–2019), which mainstreamed ESD in policy and practice and built global communities of practice. Subsequent evaluations emphasize how these initiatives scaled whole-institution approaches and multi-stakeholder partnerships while revealing persistent implementation gaps (UNESCO, 2021). With the adoption of the ESD for 2030 framework, ESD has been repositioned as a lever for achieving Sustainable Development Goal (SDG) 4.7 and the wider 2030 Agenda, prioritizing policy alignment, learning environments, educator capacity, youth engagement, and community action, shifting emphasis from projects to system-level transformation (UNESCO, 2020).

Recent bibliometric and scoping reviews show a rapid expansion and diversification of ESD scholarship since the late 1990s, with notable growth after 2015. These studies document increasing attention to competencies, whole-school approaches, and regional variations, alongside critiques of uneven quality and impact (Tafese & Kopp, 2025; Pan et al., 2024). At the same time, comparative studies highlight the conceptual distinction and continuing tensions between environmental education and ESD: while environmental education often centers ecological knowledge and conservation, ESD integrates sociocultural, political, and economic dimensions and orients learning toward sustainability action and justice (Suárez et al., 2023).

Field research continues to reveal challenges in curriculum integration, educator preparation, and assessment of action-oriented learning, even as student demand and policy momentum rise. For example, higher-education studies in Latin America report limited ESD literacy and uptake relative to environmental education, pointing to the need for clearer competencies, authentic projects, and institutional incentives (Acosta-Castellanos et al., 2024). Overall, ESD's evolution reflects a shift from awareness to agency: from teaching about sustainability to learning for sustainability, with current efforts focused on embedding ESD across systems, professions, and communities to catalyze just transitions by 2030 (UNESCO, 2020).

Overview of global and local sustainability challenges

Sustainability challenges have become pressing concerns at both global and local levels, with climate change, waste management, and water scarcity being among the most critical. Globally, climate change poses significant risks through rising temperatures, extreme weather events, and biodiversity loss, threatening ecosystems and human well-being (IPCC, 2022). Waste management is another critical issue, as rapid urbanization and consumption patterns have intensified solid waste generation, with inadequate disposal methods leading to pollution and health hazards (Kaza et al., 2018). Water

scarcity also remains a global challenge, particularly in arid and semi-arid regions, where demand surpasses supply due to population growth, industrialization, and agricultural use (UNESCO, 2020).

At the local level, many developing countries face amplified sustainability pressures. In African contexts, poor waste management infrastructure exacerbates urban pollution, leading to environmental degradation and public health risks (Kamugisha, & Mhanga, 2020). Similarly, water scarcity in regions such as sub-Saharan Africa is compounded by poor governance, climate variability, and inadequate investment in water infrastructure (Boretti & Rosa, 2019). Climate change impacts are also locally felt through shifting rainfall patterns, droughts, and flooding, which disrupt livelihoods and food security (Serdeczny et al., 2017).

Addressing these sustainability challenges requires integrated approaches that combine global cooperation with localized interventions. Climate action strategies, such as renewable energy transitions and carbon reduction policies, are vital at the global scale (IPCC, 2022), while community-based waste recycling and water conservation initiatives are essential at the local level (Kamugisha & Mhanga, 2020). Bridging global and local perspectives is thus critical for ensuring environmental sustainability and building resilient societies.

Importance of integrating glocal perspectives in education

Integrating glocal perspectives in education which refers to teaching that links global issues to learners' local realities enriches relevance, equity, and agency in African classrooms. Scholars argue that curricula become more meaningful when they braid local knowledges with planetary challenges such as climate risk, migration, and digital disruption, rather than importing "one-size-fits-all" models (Odora-Hoppers, 2002). In South Africa, Le Grange shows how place-based and sustainability-oriented teaching helps students read their communities as texts while cultivating capacities for global citizenship; this bridges the local lifeworld with wider ecological and social interdependence (Le Grange, 2022). Waghid extends this by advancing an African philosophy of higher education often framed through Ubuntu/glo-Ubuntu—that nurtures dialogical, justice-seeking citizenship across digital and physical spaces, making global citizenship education (GCE) both ethically grounded and context-responsive (Waghid, 2023).

Decolonial thinkers caution that "global" agendas can reproduce colonial hierarchies unless internationalisation becomes pluriversal translating across knowledge ecologies and centring Southern archives; a glocal lens is thus vital to build planetary curricula without erasing locality (Ndlovu-Gatsheni, 2020). Policy analyses further note that GCE targets under SDG 4 risk marginalising teachers and classroom enactment; empowering educators to design glocally relevant tasksmcommunity inquiries, local data projects, and translocal dialogues improves both uptake and impact (Rose & Sayed, 2023). Overall, glocal integration cultivates learners who can diagnose local problems, mobilise indigenous and scientific knowledges, and collaborate beyond borders an educational praxis suited to Africa's development priorities and to shared global futures.

Bridging global knowledge with local action

Bridging global knowledge with local action has become an important framework in education, development, and sustainability discourses, as it emphasizes contextualizing universal knowledge to address community-specific needs. Scholars argue that global frameworks, such as the Sustainable Development Goals (SDGs), only become effective

when translated into locally relevant practices that reflect cultural, social, and economic realities (Sachs, 2015). In African contexts, integrating indigenous knowledge systems with global scientific insights enhances innovation and strengthens local ownership of solutions (Odora-Hoppers, 2002). For example, in environmental management, local communities' traditional ecological knowledge has been effectively combined with global climate models to address resource scarcity and climate adaptation (Nyong et al., 2007).

Education also serves as a critical arena for bridging global and local knowledge, where curricula reforms emphasize glocal perspectives that prepare learners for global citizenship while rooting them in local realities (Tikly, 2019). Furthermore, research shows that participatory approaches involving community actors are vital in ensuring that global ideas are not imposed but adapted in ways that resonate with local values and practices (Keevy & Chakroun, 2015). Ultimately, the bridging of global knowledge and local action is not a linear process but a dialogical one, requiring mutual respect, co-creation, and continuous negotiation to foster sustainable and contextually relevant change (Ostrom, 2010).

Studies on student awareness or attitudes toward sustainability

Studies on student awareness and attitudes toward sustainability have grown significantly in recent years, as higher education institutions are increasingly seen as key actors in advancing sustainable development. Research indicates that students generally recognize the importance of sustainability but often lack a comprehensive understanding of its multidimensional nature, which encompasses environmental, social, and economic dimensions (Lozano et al., 2017). In African contexts, studies reveal that while awareness is rising, sustainability is often perceived narrowly as environmental protection, with limited integration of social justice and economic equity issues (Sharma & Kelly, 2014). For instance, a study among South African university students showed strong concern for climate change but relatively weak engagement with sustainable consumption practices (Mawonde & Togo, 2019).

Globally, scholars have noted that positive attitudes toward sustainability do not always translate into sustainable behaviors, highlighting the gap between knowledge and practice (Barth & Rieckmann, 2016). Integrating sustainability into curricula has been shown to significantly improve students' awareness and foster critical thinking about global challenges and local responsibilities (Thomas, 2015). Furthermore, participatory learning methods that engage students in community projects have been found to deepen their commitment to sustainability beyond theoretical awareness (Lozano et al., 2017). Overall, the literature emphasizes that fostering meaningful student awareness and attitudes requires a holistic approach that combines curriculum reform, campus initiatives, and experiential learning opportunities (Mawonde & Togo, 2019).

METHODOLOGY

The study employed a descriptive survey research design. This choice of the design becomes necessary in order to gather accurate, systematic, and quantifiable information about the characteristics, opinions, attitudes, or behaviors of the study population. It is particularly suitable for education and social science research where the goal is not to manipulate variables but to describe phenomena as they naturally occur.

The study population comprise of all undergraduates in South African Universities. The sample for the 177 (40 male, 135 female and 2 non-binary) second to fourth year undergraduate students in the University of Johannesburg, South Africa as they were

high school students. The data collected was analysed using descriptive statistics. The research questions were analysed using frequencies percentages. Approval was gotten from the Research and Ethics Committee of the sampled university.

RESULTS AND INTERPRETATIONS

Research Questions 1:

What is the level of students' knowledge and understanding of sustainability concepts, principles, and issues.

Table 1

Evaluation of Sustainability Awareness and Knowledge Among Students

Constructs	Responses	Freq	Precent	Mean	Std. Dev.
To achieve sustainable development, every human being is entitled to access to good education	Disagree	5	2.8	4.38	0.75
	Neutral	13	7.3		
	Agree	69	39.0		
	Strong Agree	89	50.3		
	Don't Know	1	0.6		
	Total	177	100.0		
Peaceful conflict resolution through discussion is necessary for sustainable development	Strongly Disagree	1	0.6	4.45	0.73
	Disagree	3	1.7		
	Neutral	8	4.5		
	Agree	71	40.1		
	Strong Agree	92	52.0		
	Don't Know	2	1.1		
	Total	177	100.0		
Respecting human rights is necessary for sustainable development	Strongly Disagree	1	0.6	4.65	0.60
	Neutral	6	3.4		
	Agree	46	26.0		
	Strong Agree	124	70.1		
	Total	177	100.0		
We have to ensure that future generations enjoy the same quality of life as we do today	Strongly Disagree	2	1.1	4.47	0.87
	Disagree	6	3.4		
	Neutral	15	8.5		
	Agree	38	21.5		
	Strong Agree	116	65.5		
	Total	177	100.0		
Men and women throughout the world must be given the same opportunities for education and employment	Disagree	1	0.6	4.69	0.56
	Neutral	6	3.4		
	Agree	39	22.0		
	Strong Agree	131	74.0		
	Total	177	100.0		

Everyone ought to be allowed to acquire the knowledge, values and skills that are necessary to live sustainably	Strongly Disagree	1	0.6		
	Disagree	1	0.6		
	Neutral	3	1.7		
	Agree	33	18.6		
	Strong Agree	139	78.5		
	Total	177	100.0		
Elimination of poverty globally is necessary for sustainable development	Strongly Disagree	1	0.6	4.63	0.65
	Neutral	10	5.6		
	Agree	42	23.7		
	Strong Agree	124	70.1		
	Total	177	100.0		
Sustainable development requires that companies act responsibly toward their employees, customers and suppliers	Strongly Disagree	1	0.6	4.64	0.66
	Neutral	5	2.8		
	Agree	56	31.6		
	Strong Agree	108	61.0		
	Don't Know	7	4.0		
	Total	177	100.0		

Source: Field Survey, 2024

In Table 1, 89.3% of students agree or strongly agree that every human being is entitled to a good education as part of sustainable development. A similar pattern is seen with the idea that peaceful conflict resolution is necessary for sustainable development, with 92.1% agreeing or strongly agreeing. Also, 96.1% of students agree or strongly agree that respecting human rights is essential for sustainable development While 87% agree or strongly agree that ensuring future generations enjoy the same quality of life is important. For equal opportunities for education and employment between men and women, 96% of students support this as necessary for sustainable development. Similarly, 70.1% of the students strongly agreed that eliminating poverty globally is essential for sustainable development, while 23.7% agreed. Only 5.6% of the students were neutral, and just 0.6% strongly disagreed. From the analysis of responses, it showed that students demonstrated satisfactory level of awareness of sustainability concepts, principles, and issues.

Research Questions 2:

To what extent are students aware of the global, national, and local sustainability challenges.

Table 2

Evaluation of Sustainability Awareness and Knowledge Among Students on Sustainability Challenges

Constructs	Responses	Freq	Precent	Mean	Std. Dev.
Sustainable development requires fair distribution of goods and services amongst people in the world	Strongly Disagree	1	0.6	4.59	0.65
	Neutral	8	4.5		
	Agree	55	31.1		
	Strong Agree	111	62.7		
	Don't Know	2	1.1		
	Total	177	100.0		

Companies in rich countries should give employees in poor nations the same working conditions	Strongly Disagree	2	1.1	4.34	0.93
	Disagree	5	2.8		
	Neutral	24	13.6		
	Agree	50	28.2		
	Strong Agree	91	51.4		
	Don't Know	5	2.8		
	Total	177	100.0		
Companies have a responsibility to reduce the use of packaging and disposable articles	Strongly Disagree	2	1.1	4.38	0.92
	Disagree	2	1.1		
	Neutral	25	14.1		
	Agree	55	31.1		
	Strong Agree	83	46.9		
	Don't Know	10	5.6		
	Total	177	100.0		
Preserving biological diversity is necessary for sustainable development	Strongly Disagree	1	0.6	4.51	0.75
	Neutral	16	9.0		
	Agree	56	31.6		
	Strong Agree	98	55.4		
	Don't Know	6	3.4		
	Total	177	100.0		
Reducing water consumption is necessary for sustainable development	Strongly Disagree	7	4.0	3.92	1.15
	Disagree	13	7.3		
	Neutral	37	20.9		
	Agree	56	31.6		
	Strong Agree	58	32.8		
	Don't Know	6	3.4		
	Total	177	100.0		
For sustainable development, people need to be educated on how to protect themselves against natural disasters	Strongly Disagree	1	0.6	4.40	0.81
	Disagree	3	1.7		
	Neutral	16	9.0		
	Agree	67	37.9		
	Strong Agree	85	48.0		
	Don't Know	5	2.8		
	Total	177	100.0		
Using more natural resources than we need threatens the health and well-being of people in the future	Disagree	2	1.1	4.64	0.65
	Neutral	9	5.1		
	Agree	42	23.7		
	Strong Agree	122	68.9		
	Don't Know	2	1.1		
	Total	177	100.0		

Stricter laws are needed to protect the environment	Neutral	11	6.2	4.66	0.63
	Agree	43	24.3		
	Strong Agree	119	67.2		
	Don't Know	4	2.3		
	Total	177	100.0		
It is important to take measures against problems that impact climate change	Strongly Disagree	2	1.1	4.58	0.70
	Neutral	8	4.5		
	Agree	51	28.8		
	Strong Agree	115	65.0		
	Don't Know	1	0.6		
	Total	177	100.0		

Source: Field Survey, 2024

In addition, 92.6% of the students strongly agreed or agreed that sustainable development requires companies to act responsibly toward their employees, customers, and suppliers, while 4% did not know. Only 0.6% strongly disagreed. Also, 93.8% of students strongly agreed or agreed that sustainable development requires fair distribution of goods and services, and 4.5% were neutral, while 1.1% did not. Similarly, 79.6% of students strongly agreed that companies in rich countries should ensure similar working conditions for employees in poor nations, while 13.6% remained neutral. 2.8% disagreed, and 2.8% did not know. On company Responsibility, 78% of students strongly agreed that companies have a responsibility to reduce the use of packaging and disposable articles, 14.1% were neutral, 5.6% did not know, and 1.1% disagreed. For preserving biodiversity, 84.2% strongly agreed or agreed that preserving biodiversity is necessary for sustainable development. 9% remained neutral, 3.4% did not know, and 0.6% strongly disagreed. The analysis of responses shows most undergraduates are aware of national, global and sustainability challenges and this was demonstrated in their responses to the various questions raised.

DISCUSSION

The findings indicate that students have satisfactory awareness of sustainability principles, aligning with earlier studies that highlight increasing environmental consciousness among African youth (Tshabalala, Lunga, & Baloyi, 2025). However, this awareness is primarily conceptual, with limited evidence of systems thinking or practical engagement. Similar patterns were observed by Mbokazi, Mkhasibe, and Uleanya (2021), who found that students could name environmental problems but struggled to translate knowledge into sustained local actions. Recent work by Ofori et al. (2023) also revealed that undergraduate students in Ghana demonstrated high climate knowledge but low participation in community sustainability practices, confirming this knowledge-action gap.

Moreover, structural barriers such as resource disparities and limited experiential opportunities, as noted by Mhlongo, Gumede, and Sibanda (2023), continue to constrain effective sustainability education. Curriculum emphasis on fact-based learning rather than participatory approaches compounds this gap (Zickafoose et al., 2024). Encouragingly, innovative pedagogical strategies (Fabeku & Fasanmi, 2024; Fasanmi, 2025) that integrate global perspectives with local realities, such as project-based learning and community-linked initiatives, have been shown to improve sustainability literacy (Uzorka et al., 2024). These findings collectively underscore the importance of

embedding glocal perspectives within high school curricula to ensure that awareness extends beyond abstract understanding into meaningful, action-oriented competencies.

RECOMMENDATIONS

Based on the findings, it is recommended that sustainability education in high schools be strengthened through experiential and project-based learning initiatives such as school gardens, recycling projects, and climate mapping, which allow students to engage practically with sustainability concepts. Teacher professional development should be prioritized to equip educators with the skills and tools to effectively link global sustainability frameworks with local realities. In addition, curricula should incorporate multilingual and culturally relevant pedagogies to ensure that sustainability education resonates with diverse learners. Building strong school–community partnerships will also help bridge the gap between classroom knowledge and local practices, enabling students to actively participate in initiatives like waste management, water conservation, and disaster preparedness.

Furthermore, student-led sustainability clubs and peer mentoring should be encouraged to foster ownership and responsibility among learners. Addressing resource disparities by improving school infrastructure, particularly providing outdoor learning spaces and access to technology, will enhance the effectiveness of sustainability education. Policymakers should ensure greater alignment between national curricula and international frameworks such as the Sustainable Development Goals and UNESCO's ESD 2030 roadmap. The integration of ICT tools and social media platforms can further expand access to sustainability knowledge, making it more engaging for students. Finally, continuous assessment of students' competencies should go beyond factual recall and emphasize systems thinking, problem-solving, and action-oriented engagement. Collectively, these recommendations highlight the need for a holistic, glocally relevant approach that nurtures sustainable attitudes and behaviors among high school students.

CONCLUSION

This study has shown that while high school students demonstrate strong conceptual awareness of sustainability principles such as human rights, gender equality, and environmental stewardship, their ability to translate this knowledge into practical, local actions remains limited.

Encouragingly, the findings reveal that most students recognize the importance of addressing global sustainability challenges; however, gaps persist in their engagement with local practices like water conservation and disaster preparedness. These results underscore the urgent need for educational approaches that bridge global frameworks with local realities through a glocal lens.

Strengthening teacher capacity, integrating experiential and project-based learning, and fostering partnerships between schools and communities are critical steps toward narrowing the knowledge–action gap. By embedding sustainability education more deeply into secondary school curricula and aligning it with both global priorities and local contexts, educators can cultivate informed, action-oriented citizens who are equipped to address the pressing environmental and social challenges of the 21st century.

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REFERENCES

Acosta-Castellanos, P. M., Queiruga-Dios, A., & Camargo-Mariño, J. A. (2024). Environmental education for sustainable development in engineering education in Colombia. *Frontiers in Education, 9*, Article 1306522. https://doi.org/10.3389/feduc.2024.1306522

Afrobarometer. (2022, November 4). *Afrobarometer's new country cards document Africans' demand for action on climate change*. https://www.afrobarometer.org/articles/afrobarometers-new-country-cards-document-africans-demand-for-action-on-climate-change/

Azeez, R. O., Rampedi, I. T., Ifegbesan, A. P., & Ogunyemi, B. (2024). Geo-demographics and source of information as determinants of climate change consciousness among citizens in African countries. *Heliyon, 10*(7), Article e27872. https://doi.org/10.1016/j.heliyon.2024.e27872

Barth, M., & Rieckmann, M. (2016). State of the art in research on higher education for sustainable development. In M. Barth, G. Michelsen, I. Thomas, & M. Rieckmann (Eds.), *Handbook of higher education for sustainable development* (pp. 100–115). Routledge. https://doi.org/10.4324/9781315852249

Boretti, A., & Rosa, L. (2019). Reassessing the projections of the World Water Development Report. *NPJ Clean Water, 2*, Article 15. https://doi.org/10.1038/s41545-019-0039-9

Ekpoto, D. F., Ukwayi, T. A., Owan, L. A., & Ekpoto, R. D. (2025). Sustainable development and climate change education in Nigeria: Benefits, challenges and way forward. *Journal of Faculty of Education, 21*(1), 197–206. https://doi.org/10.2139/ssrn.5297399

Fabeku, O. E., & Fasanmi, S. A. (2024). Appraisal of transition challenges and adjustment of first-year students at a Nigerian university. *Educational Challenges, 29*(2), 80–96. https://doi.org/10.34142/2709-7986.2024.29.2.05

Fasanmi, S. A. (2025). Utilisation of online resources and learning outcomes of undergraduates in Nigerian universities. *Educational Challenges, 30*(2), 35–47. https://doi.org/10.34142/2709-7986.2025.30.2.03

Hopwood, B., Mellor, M., & O'Brien, G. (2005). Sustainable development: Mapping different approaches. *Sustainable Development, 13*(1), 38–52. https://doi.org/10.1002/sd.244

Intergovernmental Panel on Climate Change. (2022). *Climate change 2022: Impacts, adaptation, and vulnerability*. Cambridge University Press.

https://www.ipcc.ch/report/ar6/wg2/downloads/report/IPCC_AR6_WGII_FullReport.pdf

Kamugisha, P. P., & Mhanga, S. F. (2020). Sustainable solid waste management in developing countries: Tanzania outlook. In A. Pariatamby, F. Shahul Hamid, & M. Bhatti (Eds.), *Sustainable waste management challenges in developing countries* (pp. 382–408). IGI Global. https://doi.org/10.4018/978-1-7998-0198-6.ch016

Kaza, S., Yao, L., Bhada-Tata, P., & Van Woerden, F. (2018). *What a waste 2.0: A global snapshot of solid waste management to 2050*. World Bank. https://doi.org/10.1596/978-1-4648-1329-0

Keevy, J., & Chakroun, B. (2015). *Level-setting and recognition of learning outcomes: The use of level descriptors in the twenty-first century*. UNESCO. https://unesdoc.unesco.org/ark:/48223/pf0000232309

Le Grange, L. (2022). Global citizenship education and the (post)human condition. In *Comparative education for global citizenship, peace and shared living through uBuntu*. Brill. https://doi.org/10.1163/9789004518827_003

Lozano, R., Merrill, M. Y., Sammalisto, K., Ceulemans, K., & Lozano, F. J. (2017). Connecting competences and pedagogical approaches for sustainable development in higher education: A literature review and framework proposal. *Sustainability, 9*(10), Article 1889. https://doi.org/10.3390/su9101889

Mashaba, E. K., Maile, S., & Manaka, M. J. (2022). Learners' knowledge of environmental education in selected primary schools of the Tshwane North District, Gauteng Province. *International Journal of Environmental Research and Public Health, 19*(23), 15552. https://doi.org/10.3390/ijerph192315552

Mawonde, A., & Togo, M. (2019). Implementation of SDGs at the University of South Africa. *International Journal of Sustainability in Higher Education, 20*(5), 932–950. https://doi.org/10.1108/IJSHE-04-2019-0156

Mbokazi, M. S., Mkhasibe, R. G., & Uleanya, C. (2021). Measuring the effectiveness of environmental education programmes in promoting sustainable living in secondary schools. *Technium Social Sciences Journal, 23*, 164–176. https://doi.org/10.47577/tssj.v23i1.2838

Ndlovu-Gatsheni, S. J. (2021). Internationalisation of higher education for pluriversity: A decolonial reflection. *Journal of the British Academy, 9*(s1), 77–98. https://doi.org/10.5871/jba/009s1.077

Nyong, A., Adesina, F., & Osman-Elasha, B. (2007). The value of indigenous knowledge in climate change mitigation and adaptation strategies in Africa. *Mitigation and Adaptation Strategies for Global Change, 12*(5), 787–797. https://doi.org/10.1007/s11027-007-9099-0

Odora-Hoppers, C. A. (Ed.). (2002). *Indigenous knowledge and the integration of knowledge systems: Towards a philosophy of articulation*. New Africa Books.

Ofori, B. Y., Ameade, E. P. K., Ohemeng, F., Musah, Y., Quartey, J. K., & Owusu, E. H. (2023). Climate change knowledge, attitude and perception of undergraduate students in Ghana. *PLOS Climate, 2*(6), e0000215. https://doi.org/10.1371/journal.pclm.0000215

Ostrom, E. (2010). Polycentric systems for coping with collective action and global environmental change. *Global Environmental Change, 20*(4), 550–557. https://doi.org/10.1016/j.gloenvcha.2010.07.004

Parayiwa, S. P., & Shabalala, N. P. (2025). Nurturing environmental awareness: How high school students in Johannesburg are shaping a greener future. *International Journal of Development Education and Global Learning, 17*(1), 22–39. https://doi.org/10.14324/IJDEGL.17.1.02

Robertson, R. (1995). Glocalization: Time-space and homogeneity-heterogeneity. In M. Featherstone, S. Lash, & R. Robertson (Eds.), *Global modernities* (pp. 25–44). Sage. https://doi.org/10.4135/9781446250563.n2

Rose, P., & Sayed, Y. (2023). Assessing progress in tracking progress towards the education Sustainable Development Goal: Global citizenship education and teachers missing in action? *International Journal of Educational Development, 104*, 102936. https://doi.org/10.1016/j.ijedudev.2023.102936

Sachs, J. D. (2015). *The age of sustainable development*. Columbia University Press.

Serdeczny, O., Adams, S., Baarsch, F., Coumou, D., Robinson, A., Hare, W., Schaeffer, M., Perrette, M., & Reinhardt, J. (2016). Climate change impacts in Sub-Saharan Africa: From physical changes to their social repercussions. *Regional Environmental Change, 17*(6), 1585–1600. https://doi.org/10.1007/s10113-015-0910-2

Sharma, U., & Kelly, M. (2014). Students' perceptions of education for sustainable development in the accounting and business curriculum at a business school in New Zealand. *Meditari Accountancy Research, 22*(2), 130–148. https://doi.org/10.1108/medar-12-2012-0042

Sterling, S. (2010). Learning for resilience, or the resilient learner? *Environmental Education Research, 16*(5–6), 511–528. https://doi.org/10.1080/13504622.2010.505427

Suárez, V. R., Acosta-Castellanos, P. M., Ortegon, Y. A. C., & Queiruga-Dios, A. (2023). Current state of environmental education and education for sustainable development in primary and secondary (K–12) schools in Boyacá, Colombia. *Sustainability, 15*(13), 10139. https://doi.org/10.3390/su151310139

Tafese, M. B., & Kopp, E. (2025). Education for sustainable development: Analyzing research trends in higher education for sustainable development goals through bibliometric analysis. *Discover Sustainability, 6*(1), Article 51. https://doi.org/10.1007/s43621-024-00711-7

Thomas, I. (2015). Challenges for implementation of education for sustainable development in higher education institutions. In I. Thomas et al. (Eds.), *Routledge handbook of higher education for sustainable development*. Routledge. https://doi.org/10.4324/9781315852249

Tian, W., Ge, J., Zheng, X., Zhao, Y., Deng, T., & Yan, H. (2024). Understanding the landscape of education for sustainable development in China. *Humanities and Social Sciences Communications, 11*(1). https://doi.org/10.1057/s41599-024-03713-y

Tilbury, D. (2011). *Education for sustainable development: An expert review of processes and learning*. UNESCO.

Tshabalala, S., Lunga, W., & Baloyi, C. (2025). Climate change education: Preparing African youth for future challenges. *Sustainability, 17*(10), 4267. https://doi.org/10.3390/su17104267

UNESCO. (2017). *Education for sustainable development goals: Learning objectives*.

UNESCO. (2020). *Education for sustainable development: A roadmap*. https://doi.org/10.54675/YFRE1448

UNESCO. (2020). *The United Nations World Water Development Report 2020: Water and climate change*. UNESCO Publishing.

UNESCO. (2021). *Global action programme on ESD: Final progress report (2015–2019)*.

UNESCO. (n.d.). Education for sustainable development: ESD for 2030. https://www.unesco.org/en/sustainable-development/education/esd-net

UNICEF. (2024). *Learning interrupted: A global snapshot of education disrupted by extreme climate events*.

United Nations. (2015). *Transforming our world: The 2030 agenda for sustainable development*. https://sdgs.un.org/2030agenda

Uzorka, A., Akiyode, O., & Isa, S. M. (2024). Strategies for engaging students in sustainability initiatives and fostering a sense of ownership and responsibility towards sustainable development. *Discover Sustainability, 5*(1), Article 320. https://doi.org/10.1007/s43621-024-00505-x

Waghid, Y. (2023). Teaching for global citizenship education online: An African philosophical approach. *Journal of Creative Communications, 19*(1), 32–42. https://doi.org/10.1177/09732586231189837

World Bank. (2024, September 4). More than 400 million students affected by climate-related school closures since 2022 [Press release]. https://www.worldbank.org/en/news/press-release/2024/09/04/education-for-climate-action-400m-students-affected-climate-related-school-closures

World Commission on Environment and Development. (1987). *Our common future: Report of the World Commission on Environment and Development* (UN Doc. A/42/427). United Nations. https://digitallibrary.un.org/record/139811

Yli-Panula, E., Jeronen, E., & Lemmetty, P. (2020). Teaching methods in biology education and sustainability education including outdoor education for promoting sustainability. *Education Sciences, 10*(1), 5. https://doi.org/10.3390/educsci10010005