SWOT Analysis of Selected Schools involved in Greening and Sustainable Development Programmes

Johannah Bopape, University of South Africa, South Africa

Abstract

This study aimed to explore the strengths, weaknesses, opportunities and threats in greening schools for sustainable development in Tshwane North District in Gauteng Province of South Africa. The research considered whether contextual factors hinder schools from effectively greening their schools for sustainable development. This research is qualitative and employed focus group interviews and observation. The study was undertaken with purposefully sampled members of the school management team and school governing body at three primary schools. Data was analysed through thematic content analysis. The major finding of the study was that school funds were swiftly depleted on resources such as water, energy, paper and equipment. Furthermore, contextual factors emerged emanating from little knowledge of greening and sustainability practices by school role players and a lack of policy framework on how sustainable development and greening schools should be implemented. The findings suggest the creation of an integrative assessment of greening school policies and strategies that embrace a practical activity plan for curriculum and infrastructure to monitor school resource management.

Keywords: *green school; sustainable development, school role players; Sustainable Development Goals*

Introduction

This environmental study is situated within a series of nested frameworks, namely, school role players, sustainable development and greening schools. Internationally, the United Nations Educational, Scientific and Cultural Organization (UNESCO) and the United Nations Development Programme (UNDP) are instrumental in assisting the United Nations (UN) teams to achieve the 17 Sustainable Development Goals (SDGs) set by UN 2030 Agenda for Sustainable Development (UNESCO & World Bank, 2021). UNESCO, as the UN specialised agency for education, is entrusted to lead and coordinate Education 2030 Agenda, which is part of a global movement to eradicate poverty through the 17 SDGs by 2030 (Leicht et al., 2018). Education for Sustainable Development (ESD) is explicitly mentioned in Target 4.7 of SDG 4 which aims to ensure that all learners acquire the knowledge and skills to promote sustainable development, and is understood as an important means to

DOI 10.4314/sajee.v38i1.04
ISSN 2411–5959

achieve all other 16 SDGs (Leicht et al., 2018; Xia et al., 2020). Education is at the heart of sustainable development (Loubser, 2014, p. 133); it is ranked among the top four (after food, water and energy) and is central to any sustainable development agenda (Leicht et al., 2018). It provides opportunities for enriching and enhancing the lives of young people to develop capabilities beyond knowledge acquisition (Kidman & Chang, 2021). Education is UNESCO's top priority because it is a basic human right and the foundation on which to build peace and drive sustainable development (Leicht et al., 2018). It seeks to ensure that all learners acquire the knowledge and skills needed to promote sustainable development, through, among others, ESD and sustainable lifestyles (Leicht et al., 2018).

The National Development Plan (NDP) of South Africa (SA) identified slow progress on sustainable resources utilisation (National Planning Committee [NPC], 2013, p. 15) and has emphasised the importance of building environmental sustainability and resilience (NPC, 2013, p. 27). Resilience is the ability of a system to prepare for threats, absorb impacts, recover and adapt following persistent stress or a disruptive event (Machese et al., 2017). Recycling, reusing and reducing waste resources promotes greening, which supports resilience to zero-waste. With these sustainability plans emerging, the emphasis was on moving towards a green economy for efficient delivery of services (Department of Environmental Affairs [DEA], 2012a). A green economy is oriented towards ecological sustainability, economic profitability and social inclusion; it is an economy that is low-carbon, resource-efficient and socially inclusive (BMZ Federal Ministry for Economic Cooperation and Development, 2013). It is also a framework for achieving sustainable development, eradicating poverty and inequality, as well as for creating jobs and providing skills in, for example, renewable energy efficiency, natural resource management, waste management and green urban transport infrastructure programmes (Nhamo, 2014). The Rio+20 outcome document *The Future We Want* subsequently contained strong arguments for education as important for a green ecology, for work and social protection, and for sustainability generally (Leicht et al., 2018). A green school promotes zero-waste to create a healthy environment that is conducive to learning, saves energy, money and has a small carbon footprint (Earthman, 2009; Kensler, 2012). A green school strives to be free of toxins, use resources sustainably, and create a healthy place for learners (National Association of Independent Schools, n.d.). It also aims to use less fuel, utilise solar energy power and practise rainwater catchment (Kerlin et al., 2015). From the South African context, the day-to-day school activities and programmes are the shared responsibility of the school management team (SMT) and the school governing body (SGB) who are both key role players and gatekeepers at the school level. They are often not knowledgeable about green schools and sustainable development, however, and need opportunities to explore how they can support green and sustainable behaviours in their schools. The findings of this study revealed contextual factors that hindered greening schools and sustainability practices by these role players.

Literature review

Sustainable development is "development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs" (Foo, 2013; Kensler, 2012, p. 792; Ogenokokwo, 2017). This definition contains two key concepts related to *needs*, namely, *needs* of the present generation and *needs* of future generations. The needs referred to are not only human needs, but also of ecological processes such as maintaining a breathable atmosphere by reducing carbon footprints. The concept 'needs' in particular includes the essential needs of the world's poor to which overriding priority should be given (SDG 1) with reducing inequity (SDG 5) by 2030. This implies development that meets social, economic, health, environmental and political needs without compromising the basis on which human needs depend (Le Grange et al. in Loubser, 2014). Furthermore, sustainable development is "the will to improve everyone's quality of life … including that of future generations, by reconciling economic growth, social development, and environmental protection" (Kensler, 2012, pp. 791-792). Economics and politicians refer to sustainable development as types of developments that are economically viable, do not harm the environment and are socially just (Botkin & Keller, 2012). Sustainable development needs are those factors that enhance the health, knowledge of ecosystems, address ecological and social challenges that humanity faces now and in the future (Foo, 2013). Factors found to be influencing sustainability are reported to be environmental (planet Earth), economic (prosperity), social (people) (Le Roux, 2014; Loubser, 2014; Spooner, 2012) and ecological in nature (Kensler, 2012). Needs of institutions such as schools must be sustained for future school generations. Basic needs like air, water, sanitation, energy and food, must be met, otherwise future school generations will suffer (Le Grange in Stevenson et al., 2013). Future generations should not pay the price for what has been caused by the present generation. Sustainable development was highlighted as integrated knowledge (Songqwaru, 2012) by the Department of Basic Education (DBE) through Curriculum Assessment Policy Statement (CAPS) (DBE, 2014), which included environmental and sustainability related content references across a number of phases and grades (DEA, 2012b). In this regard, environmental education is a cross-cutting principle and content area contributor in the curriculum (DEA, 2010). Taking into consideration global and local reports in South Africa, it is imperative that school key role players, lead and manage resources effectively by transforming towards sustainable development through green school initiatives.

Many efforts directed towards saving the environment are green, sustainable and also save money in operational costs (Gordon, 2010; Ramli et al., 2012). A green school is a loose label for other environmental initiatives managed by various non-profit non-governmental organisations such as the Wildlife Environment Society of South Africa (WESSA, 2018) and government departments. Schools' labels such as eco-schools, enviro-schools, green schools and sustainable schools can collectively be referred to as green schools (Kensler, 2012). It is however important to consider the following: "Green development is not about the way the environment is managed, but about who has the power to decide how it is

managed" (Adams, 2009, p. 379). To green the school, the SGB and the SMT need to ensure that the school's operational budget is managed carefully and responsibly so that the school has money for all its programmes and activities, and they should communicate regularly and efficiently with all stakeholders (DBE, 2015) and within the school.

A green school includes efficient use of resources, healthy operations, an ecological curriculum, nutritious food and sustainable community practices (Chapman, 2012). Research by Dr Joseph Allen and fellow researchers of the Harvard T. H. Chan School of Public Health in the US focused on green buildings and summarised the health benefits for the people who work in them (Medical Health Report, 2015). They reported that occupants of green buildings have less exposure to allergens, pollutants and environmental contaminants, which lowers absenteeism due to asthma and allergies (Medical Health Report, 2015). Most studies view green schools as healthy (Kensler, 2012; Kerlin et al., 2015; Strife, 2010) and as supporting curricula and building teacher morale (Kerlin et al., 2015). A green school promotes environmental and sustainable development knowledge, since it includes the following components: efficient use of resources, healthy operations, ecological curriculum, nutritious food and sustainable community practices (Chapman, 2012). Environmental management and resource protection should be a cross-cutting issue, requiring action by a range of school role players (DEA, 2010).

Problem statement

The research problem of this study emanates from experience in teaching linked to resource depletion and shortages as problems in schools. Schools consume a considerable amount of non-renewable energy and waste resources like water, stationery and photocopying paper. Resource depletion problems are exacerbated by funding that is not consistent. Green schools save money because they are healthy, reduce absenteeism and are cost-effective (Chapman, 2012; Kerlin et al., 2015). Future school generations are at risk if the present generation does not take action and efforts are essential to ensure that better environmental learning and actions are sustained and become part of how schools are managed (Ringdahl, 2008). Taking into consideration the need to address these problems in schools, this study explored answers to the main research question: "What are the strengths, weaknesses, opportunities and threats in greening a school for sustainable development?" and the following sub-question: "How do the contextual factors in the school shape the greening of the school?" A SWOT analysis (Strengths, Weaknesses, Opportunities and Threats) was chosen to derive meaningful results from data to answer the main research question.

Conceptual and theoretical framework

Sustainable development involves ensuring that while one uses resources one has, one will have these resources for longer (Jobo, 2013). Spooner (2012) maintained that sustainability is the idea that humans can use and manage natural resources so that those resources

can provide for human needs for as long as possible (potentially forever). Sustainable development involves sustainability of resources and sustainability of the ecosystem (Foo, 2013; Kensler, 2012). As Sauve (1999) pointed out, sustainable development is the ultimate goal of environmental education (EE), hence the term education for sustainable development (Gough, in Stevenson et al., 2013). The continuous usage and development of natural resources without compromising future existence is sustainable development (Msezane, 2014). The concept of 'green' is polysemous and is inextricably intertwined with ESD, sustainability and EE (Jobo, 2013). Green schools focus on sustainability (Kensler, 2012) and can be seen as a pathway to sustainability (Ramsarup & Ward, 2017) and as a sustainable approach towards EE (Somwaru, 2016). Green buildings are designed to meet EE objectives such as using energy, water and other resources more efficiently by reducing the overall impact on the environment (Ramli et al., 2012).

Ecological democracy, sustainability and school leadership complexity theories were useful in this study to analyse and interpret collected data. The theoretical framework informed the choice of the literature reviewed, data collection methods, data analysis and interpretation (Kawulich, 2012). Given this research's emphasis on greening schools and sustainable development, the first level of the theoretical framework adopted ecological democracy theory, which integrated ecology, democracy and greening school phenomena. This study then proceeded to utilise sustainability theory to understand how green schools seek to find sustainable consumption patterns regarding schools' ever-growing demands for learner and teacher support material related to energy, transport etc. In addition, the study considered how greening schools and sustainable development are also located in sustainability theory. This study further attempted to understand how economic, social and environmental aspects are considered when responsibility is taken for these at school. Finally, leadership complexity theory was employed since the complexities that arise in the educational endeavour concern not only the physical (attributes or resource use depletion and consumption), but also normative questions of how leaders' responsibility is taken and assigned at schools. Ecological democracy theory is eco-centric (Kensler, 2012). The need for sustaining school resources by ensuring that all stakeholders participate is embedded in sustainability theory (DEA, 2012a; Jenkins, 2009), which is concerned with sustaining the present school generation resources for future school generations to thrive too. School leadership complexity theory is concerned with the complex, non-linear, unpredictable systems that significantly impact school key role players, relationships and communication within them (Lichtenstein et al., 2006).

Research methodology

This study viewed sustainable development and green schools as the central phenomena requiring exploration and understanding; therefore this study was qualitative and exploratory since both these approaches provide significant contributions to both theory and practice (McMillan & Schumacher, 2014, p. 344). An interpretivism paradigm was

adopted since interpretivism argues that scientific methods (positivism) are not often suitable for the study of organisations (such as schools) and not often appropriate for study of human behaviour, actions and experiences (Creswell, 2014). A case study design was employed by collecting data from members of the SMT and SGB of selected schools in Tshwane North District who participated in focus groups and observations. A case study design takes into consideration a broad range of contextual and complex conditions which are likely to come from multiple and not singular sources of evidence (Yin, 2012).

Population and sampling

The population studied emanated from three purposefully and conveniently sampled SMT and SGB members from three Tshwane North District public primary schools in Gauteng Province of South Africa. Schools were conveniently sampled due to their geographical proximity to the researcher in order to be cost effective in terms of travelling. Purposeful sampling was selected as a small, targeted sampling group was required (Creswell, 2013; Maree, 2012; McMillan & Schumacher, 2014). Tshwane North District was selected as it has a range of populations in different settings and a city, township and village school were selected. The SMT and SGB members were sampled because they are key role players and gatekeepers at the school level. The SGB is allocated financial powers and plays a role in staffing and promotion of teachers (South African Schools Act [SASA], 1996). The SMT manage professional matters of the school and advise the SGB on resources needed to provide quality teaching and learning (Employment of Educators Act [EEA], 1998). There were 15 SGB and seven SMT members in the city school, 12 SGB and five SMT members in the township school and eight SGB and four SMT members in the village school. The components of the SMT and SGB members are listed in Table 1.

Table 1: *Components of the participants (Source: EEA, 1998; SASA, 1996)*

SGB members	SMT members
Principal (as ex-officio)	Principal (Site manager)
Parents or guardians of learners	Deputy principal
Teacher representatives	Heads of departments
Learner representatives	Senior teachers
Co-opted members	
Non-teaching staff	

Data collection instruments

The data was collected from two sources, namely, focus group interviews in phase one and semi-structured observation in phase two to achieve triangulation and increase trustworthiness (Brundrett & Rhodes, 2014) and to verify information collected in the participants' interviews (Hancock & Algozzine, 2011). Four to six participants from each school participated in semi-structured web-based focus group interviews (Bolderston, 2013) using Internet platforms such as email and WhatsApp. The larger the number of participants in a focus group, the more data can be collected. Thus in this study, the most data came from the township school with six participants followed by the village and city schools with five and four participants respectively. The open ended questions consisted of five thematic areas extracted from the literature; probing questions led to clarity. To protect the privacy, dignity and beneficence of the participants (Ruane, 2005), ethical clearance was submitted to and received from the Ethics Review Committee of the University of South Africa. Necessary permission was also obtained from the Gauteng Department of Education prior to data collection.

Data presentation

The results are presented to answer the main research question and sub-questions, firstly according to what was discovered in the focus group interviews in phase one, and secondly according to the semi-structured observations in phase two of each participating school.

Focus group interviews

The participants were interviewed as a group, rather than individually (McMillan & Schumacher, 2014). All online and text-based interviews were transcribed verbatim and organised according to the pre-determined themes in the interview guide. A setting code was used to identify participating schools: S1 (city school), S2 (township school) and S3 (village school). Each participant was coded as P1, P2, P3. The focus group interviews mainly explored the contextual factors that shaped the greening of the school (research sub-question).

Contextual factors in the school that shape the greening of the school

Contextual factors identified were categorised as (a) contextual factors as a result of school context; and (b) contextual factors due to bad planning by schools.

a) Contextual factors as a result of school contexts

The findings clearly indicated that the sources of funding in schools were government funding (S2 and S3), payment of school fees (S1), NGOs and fundraising (all schools). The fact that all schools need extra funding indicates that that there are contextual factors linked to schools operating efficiently. As P1 (S1) stated: "Parents are persuaded to pay school fees through constant letter reminders and during the Annual General Meetings. However, many of them still struggle to pay or no payment at all is made." This case study revealed that the current methods used to generate funding are not sufficient to cover schools' needs and the methods used to collect funds are not sustainable. There was, however, a high level of disparity, based on the schools' quintiles, among these schools with S3 and S2 having limited resources while S1 had sufficient resources.

b) Contextual factors as a result of bad planning by schools

P3 (S2) claimed they borrow resources from neighbouring schools. P2 (S1) stated that "sometimes we have to out-source from other schools" while according to P3 (S3), "we struggle to get donations and we get some little funds from fundraising". Water, electricity and paper are, according to P1 (S1), "a nightmare", with these resources running out and parents "still struggle to pay". Participants in S2 named issues such as burglary, under-resourcing and misuse of learner and teacher materials as causing constraints to the school, whereas S3 participants reported theft, vandalism and expensive services (electricity, telephone, gas refilling) as factors that deplete school resources swiftly. P3 (S2) reported that he had observed considerable misuse of resources like books, chalk and markers, though they try their best to use these carefully. P5 (S3) reiterated that "schools need proper planning, sharing of ideas, teamwork, time management and making estimates when running fundraising projects". It is evident from the group in this research that the constraints and challenges that all schools faced were contextual factors due to poor planning.

Observation results

The researchers used field notes based on observations at each school in order to achieve triangulation and hence increase trustworthiness (Brundrett & Rhodes, 2014). Ultimately a SWOT analysis was developed based on the interviews and observations.

SWOT analysis on greening the school

This section focuses on answering the main research question. Research data was organised by means of deductive thematic content analysis with five pre-determined thematic areas drawn from South African Green Schools Programme (SAGSP) (Bizcommunity, 2017). A SWOT analysis was employed for each participating school using these thematic areas to explore sustainable development approaches implemented in the schools. Areas that show evidence of positive or best practices were interpreted as strengths, the negative or worst environmental practices as weaknesses, and those practices that could guide or provide local planning approaches to achieve sustainable development as opportunities. Finally, those practices that were dangerous and could lead to health and safety risks were interpreted as threats. The findings across all cases are summarised in Tables 2, 3, 4, 5 and 6 below according to the themes of waste management; energy efficiency; water conservation; landscaping, tree planting and beautification; and institutional management.

Table 2: *SWOT analysis on waste management*

Strengths	Weaknesses	Opportunities	Threats
All schools were clean, litter-free and odour-free. Waste is sorted for recycling (S2). Organic waste is composted for use on lawn and in flower, fruit and vegetable gardens (S3).	No reuse, composting or recycling of any waste (S1 & S3). Lack of gardens, sufficient lawns and trees around the premises (S2).	Recycling of waste materials could generate money for S1 and S3. Grass could be composted for fertilising fruit and vegetable gardens in S1 and S2.	Refuse removal solely by the municipality in S1 and S2 puts a strain on municipal landfill sites and results in financial loss to the school.

Table 3: *SWOT analysis on energy efficiency*

Strengths	Weaknesses	Opportunities	Threats
Laptops are put on safe mode after school and a generator used as a backup during power failures and load shedding (S1); electrical appliances switched off after school to save costs periods (S2, S3); gas stoves used for cooking in the school kitchen which saves money in the long run (S3).	No energy efficient lights and non-renewable energy source (all cases). Outside lights are switched on the entire night due to theft and vandalism (S2). It is costly to use non-renewable energy sources (all cases).	Solar energy and energy generated by renewable sources such as wind energy can be used as a clean, free and renewable alternative to electricity that is very costly. Fossil fuels could be used during power failures and load shedding (all cases).	Non-renewable energy sources are taxing schools heavily on electricity bills (all cases); safe mode for electronics is still costly, rather switch off (S1); no energy conservation action plans implemented (all cases).

Table 4: *SWOT analysis on water conservation*

Strengths	Weaknesses	Opportunities	Threats
Use of clean municipal water and leaking taps and pipes repaired (all cases); switching off taps; using water containers and basins in all classes for drinking and washing hands (S2); harvesting rainwater in water tanks for backup during municipal water stoppages (S2 and S3); using borehole water for backup purposes (S1 and S3). Reusing of dripping and used water to water the lawn and gardens leads to positive conservation of water, and using jerry cans as water containers for drinking in classes also conserves water (S3).	No harvesting of rainwater (S1); municipal water is costly (all cases); no surveys to monitor water usage (all cases); no water testing kits for borehole water (S1 and S3); no testing or purification kits for rainwater (S2 and S3).	S1 could install water tanks to harvest rainwater to save money and the environment at the same time. S2 could dig boreholes to use its water for backup purposes; water needs to be purified for safety and health purposes.	Lack of harvesting rainwater can cause soil erosion and floods (S1), lack of testing and purification kits for rainwater (S2 and S3) and borehole water (S1 and S3) poses safety and health risk to the occupants.

Table 5: *SWOT analysis on landscaping, tree planting and beautification*

Strengths	Weaknesses	Opportunities	Threats
Plants surrounded the school buildings to allow rainwater runoff, fresh air, shade, promote healthy air quality, are used as learning tools in Natural Sciences, provide beautification, act as wind breakers and prevent soil erosion (all cases); building was surrounded by few trees, lawn and paving bricks (S2).	Lack of indigenous medicinal plants; plants are not labelled for educational purposes (all cases); insufficient space for lawns and tree planting (S2). Lack of indoor plants (all cases). Visibility of weed plants (S3).	Indoor plants need to be promoted because they improve air quality in classrooms. S2 needs to participate in more tree planting programmes.	Lack of indoor plants and geo-thermal air conditioners in classrooms pose a health and safety risk (all cases); weed plant species pose a health risk and could damage the school ecosystem (S3).

Table 6: *SWOT analysis on institutional management*

Strengths	Weaknesses	Opportunities	Threats
Parents pay school fees (S1); the state is the main funder of the schools (S2 and S3); school community support funding and participates in fund raising; employment of local people leads to positive attitudes in the local community regarding job creation and alleviation of poverty (all cases).	Some parents unable to pay school funds due to loss of jobs (S1); all schools not registered as Eco-Schools; schools are predominantly dependent on state funding (S1 and S2); problems with theft and vandalism (S2).	Parents who are unable to pay school funds need to volunteer to provide other services to the school (S1); security systems such as alarm systems need to be installed to reduce loss of resources (S2); network tower installed by a private company at the school will assist the school in future when it adopts a paperless mode of teaching (S3).	Increase in unemployment rate propels parents to apply for school fund exemption (S1). State funding is unreliable especially after Covid-19 pandemic (S2 and S3). Some buildings are very old and pose a health and safety risk.

Data analysis

This study employed deductive thematic content analysis using pre-determined themes. The thematic framework of this study was developed deductively using concepts with pre-determined themes from the three theories underpinning the study to create themes for interview questions. The deductive thematic content approach involves using predetermined frameworks to analyse data (Burnard et al., 2008) informed by literature. The five pre-determined themes discussed above were used for observations. Theoretically, this study is environmental in nature, integrating ecological democracy (Kensler, 2012), sustainability (DEA, 2012a; Jenkins, 2009) and complexity leadership theories in education (Lichtenstein et al., 2006; Morison, 2002). Data collected were transcribed, and codes were used to identify both setting and participants. The focus group interviews mainly explored the contextual factors that shaped the greening of the school (research sub-question).

Many South African learners, particularly black learners, are still based in disadvantaged locations pre-designed by the apartheid regime, such as impoverished townships and villages where service delivery remains problematic (Le Roux, 2014). The state has categorised schools into quintiles whereby disadvantaged school communities at the mercy of the state are in quintile one. The state has declared them non-fee paying schools and they are funded according to the National Norms and Standards for School Funding (NNSSF, 2018). S1 is in quintile four and is situated in the city of Pretoria and was a whites-only school during the apartheid regime. S1 charges school fees as determined by the SGB according to SASA (2007). S2 and S3 are in quintile one and struggle to be on a par with their counterparts in S1. The codes for the open-ended questions in interviews were organised according to five pre-determined themes, namely, (1) sources of funding; (2) experience with resource depletion; (3) experience of using school resources; (4) educational experience on resource

use; (5) sustainable development. Finally, a SWOT analysis was employed to answer the main research question.

Rigour

Credibility was enhanced through the researcher's prolonged stay in the field until data saturation; triangulating focus group interviews with observations; member checks; and pilot-testing. Selecting participants with the best knowledge regarding the research topic enhanced transferability and increased trustworthiness. Asking the same questions to all participants in interviews and observations enhanced dependability. Transcribing the interviews verbatim with manifest content enhanced confirmability. Manifest content implies that the data collected accurately represented the information that the participants provided and was not invented by the researcher (Elo et al., 2014).

Discussion of results

Focus group interviews

The group, rather than the individual, was the fundamental unit of analysis. Focus group interview results were presented according to the pre-determined themes below.

Theme 1: Sources of school funding

The schools' data revealed that all three sampled schools predominantly relied on government funding to survive, although in unequal contributions due to different school quintiles. This is evident in the statement of S1-P4 that "We are quintile 4 school, therefore, our learners are paying school fund. We also had some bit from state funds." The data also revealed that S1 is well-resourced when compared to S2 and S3 which are less well-resourced and are no-fee paying schools. The school context of S1 and S2 revealed serious socio-economic problems. Data revealed that greening schools is a necessity for all the schools to achieve sustainable consumption of resources. This is evident in some of their responses to the open-ended questionnaire: "Every year prices of resources like electricity and equipment go up, nothing goes down … infrastructure maintenance and machines are expensive to replace, to service equipment or buy new ones is also expensive (S1-P3). S2-P6 stated that "these resources need to be sustained as they are significant for teaching and learning … We want them to last longer." S3-P2 asserted that "without electricity, there won't be any power for copying machine; without paper, the school won't be able to make copies of activities; without books, there won't be any effective teaching and learning; and without water, there won't be any life at school". All participants acknowledged that fundraising and donations were not sufficient nor effective in covering the schools' needs, and noted that it is difficult to generate school funds, providing reasons such as: "not all organisations donate money, some donate school uniform to needy learners" (S3-P3).

Theme 2: Experiences with resource depletion

All schools collectively reported issues linked to maintenance, infrastructure improvement, electricity, water bills, transportation, catering, stationery as services that depleted school funding. S2-P5 reported over-admission, lack of security, burglary, theft and educators' transportation for workshops as causes of depletion of school finances and resources. S1-P3 reported that the Department of Education provided assistance with furniture, stationery, books, maintenance and nutrition. According to the participants, the funding is not sufficient and once depleted, the Department does not entertain any further requisitions.

Theme 3: Experience of using school resources

With regard to infrastructure, the participants noted lack of maintenance linked to broken windows and doors; problems with electrical appliances and cables; sewage blockages; theft and burglary. To save water, S2 and S3 noted that teachers monitor how the children pour water into glasses in the classrooms. According to S2-P2, rainwater is stored in water tanks for standby and recycling is also taking place, and S3 used gas for cooking. Contrary to these positive behaviours, P3, P5 and P6 in S2 were concerned about not servicing resources, using cheap resources that deplete faster, lack of water and electricity policies, leaving dripping taps, not switching lights off after school use, and theft of electrical cables. It was evident that schools do not have policies to manage resources like water, electricity and usage, though some school members try to save these resources irrespective of policy endorsements.

Theme 4: Educational experience on resource use

S1 stated that they taught their learners how to be responsible towards school property (P2); they use resources sparingly and improvise where there is a shortage or lack of resources (P4). S2 participants reported that they learnt "proper stock taking, high level of retrieving and replacing system of lost books". S3 participants reported that they learnt "new strategies to recover depleted resources, that waste can make money".

Theme 5: Sustainable development

S1 reported that resources to be sustained are "infrastructure (buildings, sports grounds, fencing, school hall, computer room and swimming pool), natural resources (water, vegetation, land or soil, atmosphere), teaching and learning materials (textbooks, paper, machines, furniture, equipment, desks, chalkboards) lights and electricity. S2 listed "furniture, laptops, photocopying machines, infrastructure (fence, gate, building) and water". These were regarded as "the engine of the school" (S2-P6). All focus groups overlooked natural resources like trees, plants and electricity. In general, the group seemed not to consider as resources knowledge, experiences and expertise of staff and students, nor that these also need to be sustained to ensure future availability rather than depletion

(Graham et al., 2015). The focus groups did not realise that human resources (expertise and knowledge) needed to be sustained so as to provide for human needs for as long as possible (Spooner, 2012).

Observation results

Observation of school sites by means of an observation schedule was used to enhance rigour. Water tanks had been installed to harvest water for different purposes. S1 did not harvest rainwater, used mainly municipal water but stored borehole water in water tanks for backup purposes during municipal water stoppages so the school would never run short of water. S2 also relied on municipal water but harvested rainwater in two tanks for the same reasons as S1. S3 relied entirely on borehole water and used harvested rainwater for watering the school garden, cleaning toilets and classrooms. Water recycling kits were not used in any cases. Rainwater runoffs in S1 and S2 were not directed and used for watering the gardens and lawn as in S3. The school garden in S3 was used to supply the school feeding scheme with fresh organic fruit and vegetables. Leaking taps were addressed since there was no visibility of water leakages in any of the schools. For monitoring and reducing water usage, S2 placed water containers in every classroom to limit frequent journeys to taps and S3 used jerry water cans (plastic 20l containers with taps). Basins were placed underneath these water containers and cans to collect dripping water which was later reused for cleaning or washing hands.

For sanitation, all schools in this research used flushing toilets and S3 had additional chemical toilets for backup purposes when water was insufficient. Pit toilets in S3 were closed and reused for storage of learner teacher support material, garden equipment and old school furniture for future recycling. A new toilet construction in S3 had employed local people. Security personnel and cleaners were also employed in all cases for screening visitors, learners and staff for Covid-19 compliance.

Landscaping of S1 and S3 was evident and grounds were well maintained with flowers, indigenous lawn and trees surrounding the building to provide outside shade, natural thermal comfort and positive carbon offsetting, whereas few plants were visible in S2. There were no indoor plants and air-conditioners in classrooms and staffrooms, though these were visible and operational in offices. Plant waste was not reused in S1 and S2, whereas S3 composted this and used it to fertilise the gardens. Recycling bins were visible (S1 and S3) for municipal waste removal, and in S2 this was sorted for recycling. It appears that recycling of paper, metals, plastics and tins was not regularly practised in S3.

There was no evidence of any solar panels or energy measuring units or energy saving lighting systems in all cases. All cases relied entirely on non-renewable electrical power. In S1 and S3 public transport was far from the schools' premises whereas in S2 public transport close to the school gate caused noise and air pollution.

Summary

SWOT analysis on greening and sustainable development of schools

The SWOT analysis on greening and sustainable development of schools enabled the identification of contextual factors that hinder sustainable development processes to shape greening of schools.

Strengths

Efficient water conservation strategies like storage of water in tanks and addressing leaking taps to reduce water wastage was visible in all cases. Borehole water (S1 and S3); rainwater catchment (S2 and S3); and collection of dripping water (S2 and S3) promoted positive sustainable development. Water conservation not only has an enormous positive effect on the environment due to ongoing shortages of water, it is also cost-effective for schools. Organic composters, water run-offs to gardens and agricultural products (S3) are helpful and relatively easy means of conserving water. School food gardens (S3) also supplied the school feeding scheme with fresh fruit and vegetables – a good example of sustainable food production that enables learners to eat cost-effective organic healthy food from the garden. These sustainable gardens also promoted habitat diversity, are butterfly- and bird-friendly and increase populations of other species in the school environment. Municipal water used in S1 and S2 is clean and healthy; it is tested for viruses after recycling before distribution to the community. At the policy level, the DBE has integrated EE and ESD content into the school curriculum. CAPS has included environmental and sustainability related subjects across all phases and subjects. This means that EE and sustainable development are integrated into the school curriculum (DBE, 2011). Therefore, education is a means that is utilised to achieve SDGs.

Indigenous plants, trees and flowers provided shade for the school buildings and playgrounds, beautified school environments, and also improved air quality (S1 and S3). Trees around the school buildings contribute to a positive carbon footprint since their waste products are oxygen, which all life depends on, and one of the waste products of humans is carbon dioxide, which plants depend on for survival. Plants improve habitats; promote diversity; increase populations of other species in the school environment; and assist learners in the study of Natural Sciences – for example "Indigenous Knowledge in relation to biodiversity" is covered in the Grade 4 curriculum (DEA, 2012). In addition, plants provide shelter to people and habitats to biodiversity, help to maintain global climate and are sources of medicines and clean water as well as being the lungs of the Earth, which add to the oxygen content of the atmosphere (South African National Biodiversity Institute [SANBI], 2018). This resonates with the findings of Carvello (2009), who established that vegetation supports the ecosystem within a school with curricular benefits for biodiversity study and is also aligned with global SDGs, eco-school themes of nature and biodiversity, and healthy living. Le Roux (2014) stressed that the environment should not be exploited,

and plants need to be protected for atmospheric stability to improve air quality, provide shade in school playgrounds, reduce water runoff, stormwater pollution, and improve the appearance of the school. Plants also produce clean, breathable outdoor air for the school community, which reduces health risks. Reusing pit toilets as storage and dripping water for cleaning and watering the school garden (S3) are notable sustainable practices. Employment of local people was positive for the local community with job creation and alleviation of poverty ultimately promoting SDGs. Public transport away from the school premises (S1 and S3) prevented noise and air pollution.

Waste reduction is a key factor in ensuring sustainable practices. All school premises were clean, clear of litter and odour-free. Waste reduction methods (such as composting solid waste from the garden and food waste – S3) that minimise waste going to landfills are positive sustainable practices that do not harm the environment. Food waste can be recycled into ultimately contributing to the production of fresh and organic food. Bins for sorting recycling (S2) promoted waste reduction and income to schools. Wastewater was reused for watering the lawn in S3. Reusing of both garden refuse and used water were environmentally friendly waste management strategies evident in S3.

Weaknesses

There were no sustainable conservation measures for water in any of the schools in this study – no water recycling, purification kits or water saving devices. There is a need for responsible sustainable water conservation strategies since water is costly. Water has to be used in a sustainable way and wastage needs to be prevented (Somwaru, 2016) at all costs due the ongoing shortage of water in South Africa. Water is a lifesaving resource and needs to be protected from pollution and any sort of contamination for health reasons. Conserving rainwater saves a significant amount of money. Schools and communities "that conserve water resources enrich learners' quality of life at schools" (Foo, 2013, p. 8) and communities. The fact that rainwater runoffs were not directed and used (S1 and S2) for watering the garden, the lawn, in fountains or towards wetlands revealed that these schools have little knowledge about creating and maintaining their own diverse local ecosystems (such as a wetland with frogs and reeds for biodiversity). Limited space for plants in the school environment (S2) posed a negative health risk to the occupants. The lack of medicinal plants in all cases deprived learners of indigenous medicine knowledge and their usage and does not promote greening and sustainable development behaviour.

Although all school premises were clean, use of green projects for sustainable development like recycling, reusing and reducing waste were not sufficient. The waste reduction methods of relying only on municipal waste removal (S1) are unsustainable. Public transport close to the school gate (S2) caused noise and air pollution. Weaknesses were also evident regarding sanitation – no water conservation was associated with flushing toilets such as flush limiting devices.

Although there are national resource management departments and legislation in SA, this is not effective since implementation does not take place at a national level (Makokotlela, 2016, p. 55). One of the duties of the institutional district support officers is to "assist principals and educators to improve the quality of teaching and learning in their institutions" (DBE, 2012) not sustainable development. The majority of role players did not specialise in water, energy, waste or forestry management. This study revealed that schools are struggling with resource management as traces of negative resource management were visible. Lack of renewable energy like wind or solar systems and not using energy-efficient lights in all cases means that electricity bills were costly for all schools. This is evident in the response of S1-P3: "money is depleted by services such as electricity bills on photocopying machines."

Opportunities

Facilities can be built with recycling water systems which take water from cooling systems and recycle that water so it is not wasted. Water from some systems can be collected at discharge, treated and reused in the same system or cycled into another system altogether. Solar panels can be installed and non-energy efficient light bulbs can be replaced with energy-saving globes which are cheap and last longer. Schools need to request resource management support from specialists in NGOs such as the Wildlife and Environment Society of South Africa (WESSA) to help manage their resources sustainably. Schools could register with WESSA's Eco-School programme which supports learners to work towards positive sustainable development behaviour. This programme is aimed at creating awareness and action around environmental sustainability at schools and their surrounding communities. Eco-Schools operates with themes such as community and heritage; biodiversity and nature; health and well-being; marine and coastal; climate change; waste; school grounds; eco-tourism; and water transport in order to support environmental learning in the classroom (WESSA, n.d). These themes support ESD in the national curriculum, with 50% of the content in some CAPS subjects being environmental. Eco-Schools need to celebrate environmental commemoration days such as National Arbor Day and Water Week to promote and encourage activism in schools and communities. DEA could roll out its specialists to schools so that more schools could be given opportunities to register for Eco-School programmes. The DEA, through the Fundisa for Change partnership programme, has continued to support transformative environmental learning to introduce teachers to relevant environment and sustainability content knowledge, teaching methods and assessment practices that will enable teachers to teach existing environmental content in the CAPS curriculum more confidently and effectively (Songqwaru, 2012).

Threats

Borehole water not tested for viruses could pose a health risk (S3). Socio-economic conditions such as unemployment constrains school funds and this might result in some schools becoming bankrupt. The air quality in the classrooms due to lack of air conditioners

and indoor plants poses a potential health hazard, which can lead to increased absenteeism and ultimately to poor performance. Schools are the backbone of society and can change the well-being of the society through green programmes and projects. Educating learners about the importance of water conservation means the school creates water-saving advocates for a future society that supports sustainable and responsible water use. The lack of non-renewable energy use through wind or solar generated power poses a threat. High levels of greenhouse gas emissions and catastrophic climate change impacts are inevitable since South Africa still uses coal generated electricity as its main source of power.

Contextual factors that shape the greening of schools

'Shape' in this study implies transforming schools in terms of positive environmental practices. Contextual factors revealed that the methods used by schools with regard to funding, learner and teacher support material and maintenance of infrastructures were not sustainable. Table 7 below shows a summary of the current state of the contextual factors according to the three pillars of sustainability in the cases studied.

Table 7: *Summary of contextual factors in study schools*

Social	Economic	Environmental
Poverty, high unemployment rate and inequities in terms of social income (all cases)	Ineffective use of non-renewable resources (all cases) Lack of economic knowledge (all cases)	Diminishing natural resources and pollution (all cases) Limited space (S2) Lack of e-waste recycling (all cases)

Addressing these contextual factors could shape the greening of the school if initiated by the DBE as an organ of the state. South Africa is bound by the United Nations Development Programme (UNDP) and the National Development Plan (NDP) to promote SDGs at the centre of its policies. South Africa is a member of UNESCO (Carvello, 2009) and DBE has successfully integrated ESD in the Curriculum Assessment Policy Statements (CAPS) (DBE, 2011). The focus should now be to put these policies into practice effectively within the entire school community to align and apply the current SDGs. These practices could shape and transform schools into sustainable, self-reliant entities.

Limitations of the study

This study, like any other study, has several limiting factors. The collection of data through face-to-face focus group interviews was interrupted by the unprecedented COVID-19 pandemic. As a result, it was difficult to approach participants and schools. This study ignored behavioural and political factors that may have had an influence. Financial

constraints limited the inclusion of all provinces, districts and independent schools, who could have been investigated quantitatively to reflect the socio-economic background to the research.

Recommendations

This study recommends the introduction of school awareness campaigns on greening schools programmes with initiatives such as solar energy which reduces greenhouse emissions. Secondly, an integrative assessment of green schools in South Africa is important that supports practical activity plans in curricula, infrastructure and research in greening schools. The green school concept is relatively new in many South African schools, and assistance is required in designing school-based sustainability programmes that involve collective decision-making from a South African context. Thirdly, green school experts in schools with a history of green school projects are important. The findings clearly pointed to the need for training and capacity building of role players in sustainable development. This study further recommends more studies using quantitative and mixed-method approaches at primary and high schools, Technical, Vocational, Education and Training (TVET) colleges and other districts, provinces and countries.

Conclusion

In conclusion, EE and ESD are the best vessels to bring about a paradigm shift from unsustainable behaviour to green, efficient, sustainable schools. In the school context, reducing, reusing, recycling and rethinking about resource efficiency is key to sustainable development and crucial for greening schools. The study revealed that all cases relied predominantly on government funding to survive, although this funding is unequal due to different quintiles. S1 was well-resourced compared to S2 and S3. There was a high level of information technology disparity among these schools with only S1 parents having sufficient resources to fund computer technology lessons. The least resourced schools are unable to access the Internet for online learning and are discouraged due to the disparity at different levels on the use of this all-important computing technology referred to as the 'digital divide' (Eyo, 2014). The Internet is often costly and networks are frequently not available. Green technology machines such as computers and laptops are paperless and use online services through the Internet thus reducing pollution as less waste is produced. The new path of technological solutions remains the best hope for a sustainable future imbued with faith in the possibility of solving environmental problems (Knutsson, 2018) such as littering. This is exaggerated by the fact that the two least resourced schools are no-fee paying schools and serious socio-economic problems were revealed. This study did not elaborate on technology in schools since current schooling is not yet paperless. There is a trail of e-waste generated from old technology that still needs to be addressed; less than 20% of e-waste is recycled, resulting in global health risks, environmental risks and loss of scarce and valuable natural materials (World Economic Forum Annual Meeting, 2020).

SDG 4 aims to "ensure inclusive and equitable quality education and promote lifelong learning opportunities for all people" (Leicht et al., 2018; Xia et al., 2020). Society needs to be provided with decent jobs (SDG 8) to reduce inequity (SDG 5) and inequity among nations with emphasis on girls and women (SDG 10) by 2030. One of the duties of the institutional district support officers is to "assist principals and educators to improve the quality of teaching and learning in schools" (DBE, 2015).

This research revealed that greening is a necessity for schools to achieve sustainable consumption of resources. In this sense, greening the school should form part of any decision-making process undertaken by role players for effective sustainable resources. Greening schools is a comprehensive concept emanating from EE and ESD and it cuts across all SDGs (Leicht et al., 2018). Since ESD is integrated in the CAPS curriculum, education is at the centre of sustainable development and drives it by ensuring that content knowledge in the curriculum provides skills to learners on how school resources such as water, paper or energy might be used sustainably to promote the 2030 sustainable development agenda. Greening the school is a sustainable approach towards EE that aims to support the biodiversity of the school environment in a sustainable manner (Somwaru, 2016). SDGs, as reported by the UN member states, indicate that green schools are central in decreasing the vulnerability of SDGs 1, 2, 3, 4, 6, 7, 10, 14,16 and increase the effectiveness of SDGs 5, 8, 9, 11, 12, 13, 15, 17 (Oghenekokwo, 2017). SDGs 1, 2, 3, 6, 7, 12, 13 and 15 directly influence the green sustainable schools on which this study focuses. Reducing over-consumption of fossil fuels and pollution in schools is green, health-driven and embraces SDG 3. Greening schoolyards with trees, grass, food and flower gardens embraces SDGs 1, 2, 3, 12, 13 and 15. It is evident that more sustainable development initiatives are needed in order to provide answers to contextual factors hindering greening schools. Overcoming these contextual factors will shape role players' ability to effectively achieve sustainable development.

Role players need to be capacitated and empowered to play their vital role in promoting sustainable livelihoods for current and future generations. Schools are the backbone of society and can change the well-being of society through green programmes and projects. Therefore, schools need to adopt more efficient sustainable methods (such as cleaning campaigns) as part of a social mobilsation programme to raise environmental awareness and encourage action in their learners to address littering, waste management and greening strategies. These practices will transfer skills and address the need to reduce, reuse and recycle waste in order to decrease the amount of waste going to the landfill sites. Schools could also share information on best small scale school gardening projects methods such as water-wise gardening; garden maintenance; seed planting of vegetables which can be sold to nearby communities and also used for the schools' feeding scheme. Schools, as hubs and vendors of communities, can help transform and prepare society to act in new creative ways of today, so that future school generations can continue to benefit from natural resources. Greening can contribute to maintaining the biodiversity of the school environment in a sustainable manner (Somwaru, 2016), and could be a major contributor to reversing the damage already done to schools.

Notes on Contributor

Bopape, Johannah
Johannah Bopape was a teacher and a member of the school management team at Edward School in the North West Province of South Africa. She holds a M.Ed in Environmental Education from UNISA and completed a PhD in Environmental Education in 2021 at UNISA.

Acknowledgements

I would like to thank my supervisors Prof A. V. Mudau and Dr S. B. Msezane for their guidance with this paper and the broader study from which it is drawn. I further extend my gratitude to the UNISA bursary fund for financial support and to all schools and role players who participated in this study.

References

Adams, W. M. (2009). *Green development: Environment and sustainability in a developing world* (3rd ed.). Routledge.

Biz community. (2017). *South African green school program launches*. https://www.bizcommunity.com/Article/196/498/160990.html

BMZ Federal Ministry for Economic Cooperation & Development. (2013). *Future-Makers. Building the future. Let's join forces. TVET for a green economy*. GIZ.

Bolderston, A. (2013). Conducting a research interview. *Journal of Medical Imaging and Radiation Sciences, 43*, 66-76.

Botkin, D. B., & Keller, E. A. (2012*). Environmental science.* John Wiley.

Brundrett, M., & Rhodes, C. (2014). *Researching educational leadership and management*. Sage.

Burnard, P., Gill, P., Stewart, K., Treasure, E., & Chadwick, B. (2008). Analysing and presenting qualitative data. *British Dental Journal, 204*(8), 429-432. http://doi: 10.1038/sj.bdj.2008.292

Carvello, M. W. (2009). *Assessment of the role of Eco-Schools in achieving whole school development through sustainability education.* [Unpublished Master's thesis]. University of South Africa.

Chapman, P. (2012). Green power: Independent schools leading the movement. *Independent Schools, 71*(3), 41-42.

Creswell, J. W. (2014). *Research design: Qualitative, quantitative and mixed method approaches* (4th ed.). Sage.

Department of Basic Education (DBE). (2011). *Curriculum and Assessment Policy Statement*. Department of Basic Education, Pretoria

Department of Basic Education (DBE). (2012). *Policy on organisation, roles and responsibilities of education districts.* Department of Basic Education, Pretoria.

Department of Basic Education (DBE). (2014). *Curriculum Assessment Policy Statements: Grades R-9*. Department of Basic Education, Pretoria.

Department of Basic Education (DBE). (2015). *Policy on the South African standards for principalship: Enhancing the professional image and competencies of school principals*. Government Printer.
http://www.gpwonline.co.za/Gazettes/Gazettes/39827_18-3_BasicEdu.pdf

Department of Environmental Affairs (DEA). (2010). *Environmental Sector Skills Plan for South Africa: A system approach to human capacity development and sector skills planning.* Government Printer.

Department of Environmental Affairs (DEA). (2012a). *South Africa Environmental outlook: Sustainability in South Africa* (Chapter 2). Department of Environmental Affairs.

Department of Environmental Affairs (DEA). (2012b*). Environmental Content in the Curriculum (CAPS)*. Government Printer.

Earthman, G. I. (3rd ed). (2009). *Planning educational facilities*. Rowman & Limited Education.

Elo, S., Kaariainen, M., Kanste, O., Polkki, T., Utriainen, K., & Kyngas, H. (2014). *Qualitative content analysis: A focus on trustworthiness.* Sage. http://doi: 10.1177/2158244014522633

Eyo, M., (2014). Digital divide in the utilization of Information and Communication Technology (ICT) in counselor education in Nigerian universities. *African Education Review, 11*(2), 91-102. http://doi: 10.1080/18146627.2014.927141

Foo, K. Y. (2013). A vision on the role of environmental higher education contributing to the sustainable development in Malaysia. *Journal of Cleaner Production, 61*, 6-21.

Gordon, D. E. (2010). *Green schools as high performance learning facilities*. Washington DC National Clearinghouse for Educational Facilities.

Graham, L., Berman, J., & Bellert, A. (2015). *Sustainable living: Inclusive practices for 21st century classrooms.* Cambridge University Press.

Hancock, D. R. & Algozzine, B. (2011). *Doing case study research: A practical guide for beginning researchers* (2nd ed.). Teachers College Press.

Jenkins, W. (2009). *Spirit of sustainability theory*. Berkshire Publishing.

Jobo, M. E. (2013). Towards integrating education for sustainable development at initial teacher training: The case of Lesotho College of Education. *Southern African Journal of Environmental Education*, 29, 283-290.

Kawulich, B. (2012). *Selecting a research approach: Paradigm, methodology and methods*. https://www.researchgate.net/publication/257944787

Kensler, L. A. W. (2012). Ecology, democracy, and green schools: An integrated framework. *Journal of School Leadership, 22*, 789-814.

Kerlin, S., Santos, R., & Bennett, W. (2015). Green schools as learning laboratories? Teachers' perceptions of their first year in a new green middle school. *Journal of Sustainable Education, 8,* 1-11.

Kidman, G., & Chang, C. (2021). Hope and its implications for geographical and environmental education. *International Research in Geography and Environmental Education, 30*(1), 1-3. http://doi: 10.1080/10382046.2021.187875.3

Knutsson, B. (2018). Green machines: Destabilising discourse in Technology Education for sustainable development. *Critical Education*, *9*(3), 1-18.

Leicht, A., Heiss, J., & Byun, W. J. (Eds). (2018). *Issues and trends in education for sustainable development*. UNESCO.

Le Roux, J. (2014). *The role of participation and technology in creating sustainable green environments.* [Unpublished Master's thesis]. North West University.

Lichtenstein, B. B., Uhl-Bien, Marion, R., M., Seers, A., Orton, J. D., & Schreiber, C. (2006). Complexity leadership theory: An interactive perspective on leading in complex systems. [Online]. *Complexity and Organisation, 8*(4), 2-12. https://digitalcommons.unl.edu/managementfacpub/8/

Loubser, C. P. (2014*). Environmental education and education for sustainable development* (2nd ed.). University of South Africa.

Machese, D., Reynolds, E., Bates, M. E., Morgan, H., Clark, S. S., & Linkov, I. (2017). Resilience and sustainability: Similarities and differences in environmental management applications. *Science Total Environment*. http://doi: 10.1016./j. scitotenv.2017.09.086

Makokotlela, M. V. (2016). *Determining the effectiveness of environmental education initiatives of selected government departments in South Africa.* [Unpublished doctoral thesis]. University of South Africa.

Maree, K. (2012). *First steps in research*. Van Schaik.

McMillan, J., & Schumacher, S. (2014). *Research in education: Evidence-based inquiry*. Pearson Education.

Medical Health Report. *How a green building influences the health of its occupants?* (2015). Retrieved June 18, 2018, from https://medicalxpress.com/news/2015-07-green-health-occupants.html.

Morison, K. (2002). *School leadership and complexity theory.* RoutledgeFalmer

Msezane, S. B. (2014). *An exploration of the impact of environmental education innovation on students in sustaining land resources: A case of Mkhondo village*. [Unpublished Master's thesis]. University of South Africa.

National Association of Independent Schools (n.d.). http://www.nais.org

National Planning Committee. (2013). *National Development Plan 2030*. The Presidency. http://www.gov.za/documents/national-development-plan-2030-our-future-make-it-work

Nhamo, G. (2014). Reviewing some implications of green for higher and further education institutions. *Southern African Journal of Environmental Education*, *30*, 79-94

Oghenekokwo, J. E. (2017). Literacy education and sustainable development in developing societies. Niger Delta University. http://doi: 10.7575/aiac.ijels.v.5n.2p

Ramli, N. H., Masri, M. H., Mohd., Mohd, Z. H., Taib, & Hamid, N. A. (2012). A comparative study of green schools' guidelines. *Social and Behavioral Science, 50*, 462-471. https://doi.org/10.1016/j.sbspro.2012.08.050

Ramsarup, P., & Ward, M. (2017). *Enabling green schools: Pathways to sustainable development – A sourcebook to support skills planning for green economies*. http://doi: 10.13140/RG.2.2.33130.62404

Ringdahl, B. (2008). Flying the international green flag. *African Wildlife*, *62*(3), 36.

Ruane, J. M. (2005). *Essentials of research methods*. Blackwell.

Somwaru, L. (2016). The green school: A sustainable approach towards environmental education (case study). *Brazilian Journal of Science and Technology,* 3-10.

Songqwaru, N. Z. (2012). *Supporting Environment and sustainability knowledge in the Grade 10 Life Sciences Curriculum and Policy context: A case study of Fundisa for Change Teacher education development project pilot project.* [Unpublished Master's thesis]. Rhodes University

South Africa. (1996). *South African Schools South Act*. Government Printer.

South Africa. (1998). *Employment of Educators Act*. Government Printer.

South Africa. (2007). *Employment of Educators Act. Education Laws Amendment Act*. Government Printer.

South Africa. (2018). *National Norms and Standards for School Funding Act*. Government Printer.

South Africa. (2007*). South African Schools Act: Education Laws Amendment Act*. Government Printer.

South African National Biodiversity Institute (SANBI). (2018). *Trees of the year.* SANBI.

Spooner, A. M. (2012). *Environmental science for dummies*. Wiley & Sons.

Stevenson, R. B., Brody, M., Dillon, J., & Wals, A. E. J. (Eds.). (2013*). International handbook of research on environmental education*. Routledge.

Strife, S. (2010). Reflecting on environmental education: Where is our place in the green movement? *Journal of Environmental Education*, *4*(3), 171-179.

United Nations Educational, Scientific and Cultural Organization (UNESCO) & World Bank (2021). *Cities, culture, creativity: Leveraging culture and creativity for sustainable urban development and inclusive growth.* UNESCO.

Wildlife Environmental Society of South Africa (WESSA) (n.d.) http://www.wessa.org.za

Wildlife Environmental Society of South Africa (WESSA) (2018). http://www.wessa.org.za

World Economic Forum Annual Meeting. (2020). Retrieved December 2, 2020 from https://www.weforum.org/events/world-economic-forum-annual-meeting-2020

Xia, F., Lu, L., & Liu, C. (2021) Construction and analysis of lifelong inclusive education 2030 framework for action. *International Journal of Elementary Education*, *9*(2), 37-45. http://doi: 10.11648/j./jeeidu.20200902.13

Yin, R. Y. (2012). *Applications of case study research*. Sage.