

Higher education for sustainable
development in South Africa and Brazil:
A comparative study

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DEDICATION

I dedicate this study and the attainment of this degree to my Grandpa George as well as my late grandparents, Sheila, Edwin, and Rose Marie. The values of respect, hard work, perseverance and courage which you have instilled in me served as driving forces, motivating me to complete this study. You helped prepare me at the start of my academic journey but never saw me reach the goal. I hope to have made you proud.

SOLEMN DECLARATION

I, Carlo Emile Daniels, the undersigned, hereby declare that the work contained in this dissertation titled:

Higher education for sustainable development in South Africa and Brazil: A comparative study

is my own original work and that I have not previously in its entirety, or in part, submitted it at any university for a degree.

Signature: 

Signed at CAPE TOWN on this 17th day of March 2022

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To my heavenly Father, all honour and glory to you forever and ever ~ 1 Timothy 1:17.

Without the selfless support and guidance from my support structure, I could not have completed this study. I wish to make special mention of the people that have supported me throughout my research journey.

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ABSTRACT

Countries globally are grappling with challenges such as food insecurity, poverty, inequality, economic growth, and climate change. The emergence of Covid-19 has exacerbated the aforesaid challenges and revealed the true nature of inequality in developing countries such as South Africa and Brazil. Now, more than ever, citizens globally require a type of education instilling knowledge, skills, behaviours and values that will enable them to take actions towards sustainable development. In other words, education for sustainable development (ESD) is necessary if the world is to mitigate current environmental, economic and social challenges. Higher educational institutions (HEIs) play a pivotal role in the quest for sustainable development, as these institutions develop future leaders, policymakers, business owners, and community leaders. The curriculum, research, extension activities and strategic planning of HEIs should be geared towards ESD, which has the potential to create a humane and fair world. The purpose of this qualitative study was to explore the effectiveness of HEIs in South Africa and Brazil in implementing ESD. In order to address the research objectives of this study, qualitative document analysis, following the principles of grounded theory, was employed, grounded in a postmodern research paradigm. The purpose of this study was distinctive, as scholarly literature is calling for more studies on the implementation of ESD in HEIs and in developing countries. In addition, the limited available research focuses on the environmental dimension of sustainability and sustainability in primary and secondary education, whereas less attention is devoted to higher education. This study addressed the latter. The findings reveal that South African and Brazilian HEIs have made considerable progress towards the implementation of ESD in their mission and vision statements, research, and extension activities. However, for improved implementation, ESD should be better inserted into the curricula and teaching practices of South African and Brazilian HEIs. In addition, there is an urgent need to provide training for educators and prospective teachers on sustainability-related pedagogical knowledge and competencies. The findings lead to the conclusion that the effective implementation of ESD will require a holistic approach of HEIs. This means that sustainability principles, knowledge and actions are clear in all academic activities and practices. Support from HEIs' leaders is imperative in this regard.

Key words: Sustainability, sustainable development, sustainable development goals, education for sustainable development, social justice

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LIST OF ABBREVIATIONS AND ACRONYMS

ESD	Education for Sustainable Development
HEIs	Higher Educational Institutions
HESD	Higher Education for Sustainable Development
MDGs	Millennium Development Goals
NDP	National Development Plan
SD	Sustainable Development
SDGs	Sustainable Development Goals
UN	United Nations
UNESCO	United Nations Educational, Scientific and Cultural Organization

CHAPTER 1: OVERVIEW OF THE STUDY

1.1 Introduction

Countries around the world are grappling with challenges such as food insecurity, poverty, inequality, economic growth, and climate change (Geographic Society, 2016; World Bank, 2021a). In 2016, it was estimated that 700 million people lived in extreme poverty globally (Van Trotsenberg, 2016). On the same note, in the year 2020, there was an increase in inequality and poverty rates in Brazil (Civil Society Working Group for the 2030 Agenda, 2020). Meanwhile, South Africa struggled to achieve sustained levels of economic growth and was identified as one of the most unequal countries in the world (Statistics South Africa, 2019). According to the Civil Society Working Group for the 2030 Agenda (2020:4) and Friedman (2020), the emergence of Covid-19 has exacerbated the aforesaid challenges and has revealed the true nature of inequality in South Africa and Brazil. Now more than ever, citizens globally need a type of education that develops knowledge, skills, behaviours, and values that enable them to take action towards sustainable development (SD). More specifically, through research and curriculum, higher education institutions (HEIs) are expected to link economic, social and environmental topics and in doing so, they play a leading role in achieving global sustainability (Jim Wu & Shen, 2016:634). In other words, education for sustainable development (ESD) is necessary if the world is to mitigate current environmental, economic and social challenges.

In response to the above-mentioned imperatives, South Africa and Brazil have committed to the United Nations (UN) 2030 Agenda for Sustainable Development. Agenda 2030 views eradicating poverty, improving well-being, protecting human rights, and restoring the earth's balance as interconnected challenges (World Economic Forum, 2015; Statistics South Africa, 2019). A total of 193 countries adopted the 2030 UN Agenda for Sustainable Development, which shows the collective commitment of world leaders to confront challenges that must be conquered if humanity is to survive on this planet (Statistics South Africa, 2019; United Nations, 2021b). The 17 Sustainable Development Goals (SDGs) and 169 targets of the UN aim to serve as a guide to shift the world onto a sustainable path which will potentially see the end of global poverty, the enhancement of dignity for all, and the assurance of social justice. Furthermore, the 17 SDGs are devoted to people, the planet, prosperity, and the promotion of peace and partnerships (United Nations, 2021a; Brazilian Government, 2017a:9).

In alignment with apprehensions regarding climate change, economic growth, reducing poverty, protecting human rights, and the attainment of the SDGs, the South African government has prioritised initiatives, policies and technology that balance environmental protection with

economic development and social justice (Department of Environmental Affairs, 2012:ii; Department of Environmental Affairs, 2015:8). Although the United Nations Educational, Scientific and Cultural Organization (UNESCO) noted that governmental policies and new technology have the potential to catalyse sustainability (UNESCO, 2014:8), the World Economic Forum (2015) recognised that it is not sufficient to contend with the environmental, social and economic challenges countries face. To create a world that is sustainable and to provide equal opportunities for all, citizens need to be equipped with the necessary knowledge, skills and attitudes, which can be accomplished through education, which is considered the most influential tool to achieve sustainability (UNESCO, 2013:7). Moreover, ESD is essential to transform the value systems of citizens and to reshape the way citizens think about and act on economic, societal and environmental challenges (UNESCO, 2014:8).

According to Hensley (2017:3), if sustainability is to be achieved, education systems must equip students (from all faculties) with the competencies to participate in the discourse and action on equal economic and social opportunities and to take stewardship of the planet and its citizens. Marques et al. (2018:43) noted that HEIs play a pivotal role in the quest for SD, as HEIs are enablers of change in society. HEIs develop future leaders, policymakers, business owners, and community leaders; thus, HEIs are responsible for developing citizens that consciously consider social, economic and environmental stewardship. The curriculum, research, extension activities and strategic planning of all faculties in HEIs should be geared towards ESD, which has the potential to create a more just, humane and fair world (Marques et al., 2018:43). Being specifically concerned about economic practices based on extracting resources from the planet and ignoring the renewal of these resources, Hensley (2017:3) highlights the importance of HEIs to, through research and teaching, educate students about human-induced impacts on the planet and opportunities for sustainable actions. As the author claims, this, in turn, will equip students to reduce fossil fuel use, inform other citizens and ultimately advance other interconnected SD initiatives that focus on the economy, the environment and society (Hensley, 2017:3).

Employing a document analysis method, the purpose of this qualitative research project was to explore the effectiveness of HEIs in South Africa and Brazil in implementing ESD. Documents such as strategic frameworks, research and innovation reports, vision and mission statements, integrated reports, journal articles, and brochures were purposively sampled to achieve the purpose of this study. The aim of the project was to explore to what extent South African and Brazilian HEIs dedicate their vision, mission and strategic planning to sustainability. In addition, special attention was paid to explore the extent to which HEIs align their curriculum and other learning practices with the principles of SD. Based on the findings, recommendations are made

for how HEIs can adjust their vision and mission statements, curriculum teaching and extension activities to foster effective implementation of ESD.

1.2 Concept clarification

Before examining the background to the rationale for the study, research objectives, research questions and research methodology, concepts employed in this study are clarified. In addition, the interconnectedness of the terminology utilised in this research study is explored.

Sustainability and sustainable development: Based on a recommendation by Da Silva Junior et al. (2018:5), the concepts of sustainability and sustainable development (SD) were not used interchangeably for the purpose of this study. In this study, sustainability was viewed as a principle, and SD was viewed as a continuous process which requires citizens to take decisions on and actions towards sustainability (Da Silva Junior et al., 2018:5).

Sustainability: UNESCO (2019a) describes four interconnected features of sustainability, namely the environment, economy, society, and culture. Sustainability is based on equal distribution and ethical principles that consider the environment, economy, society, and culture which are required for furthering the development of society (Ciegis et al., 2009:30).

Sustainable development: Grant (2020) and UNESCO (2019a) describe SD as preparation for the future, where environmental, social, cultural and economic matters are balanced in the attempt to attain an improved quality of life. Sustainable development is viewed as processes aimed at achieving the long-term goal of sustainability (UNESCO, 2019c). For this research project, SD was based on three pillars, namely environment, economy, and society. Furthermore, SD is defined as development that satisfies the needs of today without compromising the ability of future generations to satisfy their needs (Ciegis et al., 2009:30; Moura et al., 2019).

Sustainable Development Goals: The 2030 Agenda for Sustainable Development adopted by all UN member states provides a guide for countries to achieve peace and prosperity for all citizens and the planet (United Nations, 2021c). Pivotal to the 2030 Agenda for Sustainable Development is the UN's 17 SDGs and its 169 targets which aim to serve as a blueprint to shift the world onto a sustainable path which will potentially see the end of global poverty, the enhancement of dignity for all, and the assurance of social justice. In addition, the 17 SDGs aim to conquer climate change and protect the environment through the improvement of education, better health care, sustainable economic growth, and equality (United Nations, 2021c; Statistics South Africa, 2019). Furthermore, the 17 SDGs are devoted to people, the planet, prosperity, and the promotion of peace and partnership (United Nations, 2021a). As recommended by

Ferguson and Rooft (2020:960), this study paid special attention to SDG 4 and its targets which aim to attain quality, equitable, inclusive and lifelong education.

Education for Sustainable Development: Kimanzi (2019:54) and UNESCO (2019c) defined ESD as a type of education that seeks to develop knowledge, skills, and values needed for SD. As reported by UNESCO (2019a), citizens that possess the knowledge, skills and values that ESD develops would take decisions and behave in a manner that promote environmental stewardship, economic viability, and a just society for present and future generations.

Social justice: The concept of social justice is based on human rights, distribution of resources, participation, and equity (Soken-Huberty, 2021). Social justice is grounded on the view that everyone deserves equal political, economic and social rights and opportunities (San Diego Foundation, 2016). For this study, social justice is defined as a process that seeks to achieve equal human rights, treatment, distribution of resources, and opportunities to all citizens (San Diego Foundation, 2016; Schenker et al., 2019:127). Ketschau (2015) drew attention to the link between sustainability and social justice by providing three reasons why SD and social justice are interconnected. Firstly, social sustainability may only be attained once opportunities in society are just and social justice has been achieved. Secondly, like social justice, SD aims to transform society (social transformation). Lastly, sustainability is linked to intergenerational justice, which implies that each generation should solve their own problems, as opposed to leaving them unattended for future generations (Ketschau, 2015). Waghid (2014:1454) noted that sustained economic development is linked to education for social justice, as economic development has the potential to reduce inequalities.

Extension activity: The term *extension activity* refers to a set of actions in the form of volunteering, social projects and community engagement initiatives that aim to improve the well-being of society through the integration of teaching and research (De Gusmão, 2020:1). Marques et al. (2018:54) and Siqueira et al. (2016:2) state that extension activities act as a bridge that enables interaction between HEIs and society.

1.3 Background to the study

Hensley (2017) and Stofleth (2016) state that achieving global SD may be problematic, especially in developing countries like South Africa and Brazil. According to Hensley (2017:2), humankind has initiated long-term (centuries to millennia) changes in the earth's environment and atmosphere, yet educational institutions, businesses, organisations, and the thinking of citizens are geared towards short-term (decade) solutions. At the cost of developing countries and to the disadvantage of global sustainability, Stofleth (2016) noted that developed countries

have already profited financially from unsustainable practices. Often, developed countries impose their newfound sustainable principles and technology on developing countries that may then experience challenges adopting sustainable practices and technology. Most developing countries depend on natural resources to create economic growth and reduce poverty. For instance, the sub-Saharan African countries rely on the foreign exchange and exploitation of oil, gas, coal, agriculture, and minerals to drive their economies and reduce inequalities. Similarly, by exploiting the natural resources belonging to developing countries, developed countries have already achieved sustained economic growth and considerable poverty reduction. Consequently, developed countries have the financial capacity to implement pollution-preventing technologies towards sustainability (Omoju, 2014). Acknowledging these inequalities, world leaders remain committed to achieving global SD.

This section is divided into three subsections. The first subsection addresses the global evolution of SD and the key events in this regard hosted in several nations between the years 1969 and 2015. The second and third subsections discuss ESD in the two contexts under investigation, namely South Africa and Brazil. The implementation of legislation, programmes and practices pertaining to SD in HEIs is also explored in the second and third subsections.

1.3.1 Pivotal global sustainable development events

The use of the term *sustainable development* (SD) can be traced back to 1969 when an oil spill in the United States of America (Santa Barbara) resulted in the passing of the National Environmental Policy Act (NEPA). The oil spill had detrimental effects on wildlife and the natural environment in the area. Consequently, SD prioritised the environment, with little attention paid to the development of the social and economic dimensions of sustainability (Stofleth, 2016; Novo-Corti et al., 2018:819). A few years later, in 1972, the term SD became popular, as it was used by the UN at the Stockholm Conference (Department of Environmental Affairs, 2019; Stofleth, 2016). During the conference, it was noted that economic growth could not be sustained by using the natural environment alone and that alternative methods of consumption and production were required. As a result, the members of the Stockholm Conference agreed on 26 principles aimed at protecting the environment. Subsequently, a series of environmental debates and new stakeholders, such as the green movement, emerged. In addition, legislation and a number of conferences and summits that enabled SD were presented around the globe (Department of Environmental Affairs, 2019).

In 1987, the Brundtland Commission published a report titled *Our Common Future*, which contained a definition for SD and a proposed route to follow on a global scale to ensure SD

(Jarvie, 2021; Stofleth, 2016). Building on the foundation set by the Brundtland Commission, the UN Conference on Environment and Development (Rio Summit), hosted in Brazil in 1992, played a pivotal role in the transformation of environmental policies worldwide (Jarvie, 2021; UNESCO, 2014:10). The event attracted leaders from 179 countries and included significant agreements to Agenda 21, the Conference of the Parties on Biological Diversity and Climate, and the provision for the implementation of the Kyoto Protocol (Cardoso et al., 2017:2). Between 1992 and early 2000, the UN held a number of influential meetings and conferences with member countries on human rights as a key strategy and framework (Cardoso et al., 2017:2). Topics such as human rights, social development, population development, the condition of women, urban development issues, and racism and discrimination were on the agenda (Cardoso et al., 2017:2; Jarvie, 2021). As is evident, the term SD expanded to contain social and economic dimensions.

In 2000, the UN officials formulated eight Millennium Development Goals (MDGs), following the Millennium Summit of the UN in New York, which were set to be achieved by 2015 (Cardoso et al., 2017:2; United Nations, 2021b). Shortly after, in 2002, South Africa hosted the World Summit on Sustainable Education (Johannesburg Summit) which proposed a decade of ESD. At the same time, the UN launched the decade of ESD to enhance the role education plays in the attainment of SD (UNESCO, 2014:9). Another historic event took place in 2015 when the UN proclaimed the 2030 Agenda for SD and the 17 SDGs were crafted with the intention to encourage development that has the potential to end poverty, combat climate change, and reduce inequalities by 2030 (Department of Environmental Affairs, 2019; World Bank, 2021b).

The scholarly literature on landmark developments between the years 1969 and 2015 highlights three features (Filho et al., 2014:113). Firstly, world leaders, researchers and experts in various fields have dedicated an immense amount of thought, discussion, commitment, and time to the goal of sustainability. Secondly, SD is an ongoing, long-term process that requires innovation, strategic planning, research, and partnership if sustainability is to be achieved. Lastly, the concept and features of SD focused on the environment and over time, SD has evolved to incorporate and link social and economic dimensions. With consideration of the aforementioned discussion, the commitment to and action towards SD of the two countries under investigation in this study, namely Brazil and South Africa, are discussed.

1.3.2 Context under investigation: Brazil

Scholarly literature (e.g., Brandli et al., 2015; Constitution of the Federative Republic of Brazil, Brazil, 1998; Brazilian Government, 2017b; Marques et al., 2018) provided evidence that Brazil is making progress towards SD through legislation, participation in Agenda 2030, and the implementation of SD in Brazilian HEIs.

Legislation protecting and promoting SD in Brazil is plentiful; however, the most significant piece of legislation protecting the environment, human rights and equality is the Constitution of the Federative Republic of Brazil (Brazil, 1998:150). It is worth noting that Brazil played a leading role in the implementation of the MDGs. Consequently, Brazil attained a seat on the UN High-Level Group that monitors the implementation of Agenda 2030 (Brazilian Government, 2017b:9). In addition, Marques et al. (2018:42) commended the proactive steps that academics in Brazil have taken to insert ESD into research and extension activities of HEIs. Similarly, Brandli et al. (2015:66) commended the Sao Paulo University for its efforts to improve the sustainable use of paper, water, and energy consumption.

As is evident in the previous paragraph, scholars point to Brazil's commitment to sustainability. Scholarly literature, however, also identifies several barriers that hinder the progress made towards SD (Brandli et al., 2015; Cernov & Pietricovsky, 2020; Fearnside, 2018; Marques et al., 2018). For instance, since the election of their new president, Jair Bolsonaro, in 2018, the Brazilian government has had a negative impact on the protection of human rights and SD (Cernov & Pietricovsky, 2020; Fearnside, 2018). Cernov and Pietricovsky (2020) noted that Brazil has abandoned its commitment to most of the SDGs.

Brandli et al. (2015:68) and Marques et al. (2018:43) voiced their concern about the insertion of ESD which has been slow in Brazil due to a lack of policies and motivation from HEIs' staff and upper management. On the same note, Brandli et al. (2015:66) stated that action towards sustainability in Brazilian HEIs has been isolated and has not been contained in an organised vision or policy. Although Brazilian HEIs focused on sustainable actions, little attention was paid to ESD, as there was a lack of funding directed towards sustainable education (Brandli et al., 2015:68).

1.3.3 Context under investigation: South Africa

Like Brazil, South Africa shows promising progress towards SD as well as pressing concerns that require attention. Scholarly literature (e.g., Constitution of the Republic of South Africa [RSA], 1996; Department of Environmental Affairs, 2019; Kimanzi, 2019; Letsema, 2019; Statistics South Africa, 2019; UNESCO, 2013) provides evidence that ESD in South Africa has

grown in quality and scope, which is reflected in three areas, namely: (a) legislation and policies; (b) commitment to the SDGs; and (c) integration of ESD in HEIs.

Firstly, South African legislation and policies entail laws that reflect and promote key ESD issues such as human rights, environmental conservation, gender equality, peace building, and social justice (UNESCO, 2013:56). One of the most significant pieces of legislation promoting SD is the Constitution of the Republic of South Africa (RSA, 1996:6), which links environmental concerns with human rights and social responsibilities. Secondly, South Africa has partaken in strategic planning meetings, programmes and summits that aim to assist the country in achieving the 17 SDGs. To that end, in 2008, the South African Cabinet embraced the National Framework for SD which aimed to declare South Africa's national vision to redirect development onto a sustainable path. In addition, South Africa participated in the Partnership for Action on Green Economy (PAGE) programme to position sustainability at the heart of economic policies and action (Department of Environmental Affairs, 2019). In 2015, South Africa linked the country's National Development Plan (NDP) with the 17 SDGs and 169 SD targets, resulting in 74% of the SD targets being addressed by the NDP (Statistics South Africa, 2019). Lastly, ESD has been incorporated into South African HEIs (UNESCO, 2013:69). UNESCO (2013:69) commended Rhodes University and the University of Cape Town for their attempts to implement ESD in their curriculum, research, and extension activities. In addition, UNESCO (2013:71) applauded South African HEIs when a review of master's degrees, specifically in the field of environmental sciences and sustainability, revealed that 50% of HEIs in South Africa offered master's programmes in environment and sustainability sciences.

Despite the promising progress made by South Africa towards ESD, there is still much to be accomplished. For instance, it is concerning that HEIs and businesses are poorly implementing legislation, policies and strategies directed towards ESD (Letsema, 2019; UNESCO, 2013). In addition, undergraduate courses presented at South African HEIs do not pay enough attention to ESD (Kimanzi, 2019; UNESCO, 2013:79). Further concerns highlighted by UNESCO (2013) are that although South Africa has a national development strategy towards SD (Statistics South Africa, 2019), to date, the country does not have a national ESD strategy and a coordinating body which has disadvantaged the implementation of ESD. Additionally, there is a lack of long-term funding for ESD (UNESCO, 2013:56).

1.4 Problem statement

Brandli et al. (2015:68) indicated that Brazilian HEIs lack research about ESD. This is in line with the statement released by UNESCO in 2013 (UNESCO, 2013:4) that more research into ESD is required, as research into ESD has proven to generate success. As the lead UN's agency for ESD, UNESCO provides UN member countries with recommendations for the successful implementation of ESD (UNESCO, 2019b). The importance of research at HEIs was also acknowledged by Marques et al. (2018:42) in that research results can inform citizens about their responsibility in environmental, social and economic stewardship. HEIs are positioned to disseminate information about SD grounded in legal and scientific facts (Brandli et al., 2015:72). The following paragraph describes why a lack of research into ESD is problematic for South African and Brazilian citizens.

As stated earlier, currently, there is a lack of research into ESD and the implementation thereof (Awuzie & Emuze, 2017:1179). Limited research into SD is problematic for the South African and Brazilian governments and thus for citizens for two reasons. Firstly, research about sustainability has the potential to bring prosperity and improvements within society (Marques et al., 2018:54). Joyce Msuya (Acting Executive Director of the UN) stated that economic growth can almost be doubled by following green economic approaches (Department of Environmental Affairs, 2019). Secondly, O'Malley (2019) noted that none of the SDGs can be achieved without HEIs contributing to the form of research, teaching and extension activities. More specifically, SDG 4 underpins all the other SDGs, which make its (SDG 4) attainment imperative for the achievement of the other SDGs. Although all levels of education have an important role to play towards the realisation of SDG 4, the role of HEIs towards the realisation of SDG 4 is imperative (Ferguson & Rooft, 2020:960). A further concern is that inequality is being amplified by Covid-19 and that businesses, government, citizens and other institutions do not fully support green economic approaches (Brandli et al., 2015:70; Department of Environmental Affairs, 2019; Friedman, 2020). Research into concrete operational steps that HEIs can follow to implement ESD has high potential to serve as an example to the aforementioned organisations (Novo-Corti et al., 2018:821). In turn, this has the potential to yield improved support towards SD.

Scholarly literature indicates that ESD has the potential to encourage environmental stewardship among the South African and Brazilian governments, citizens, and businesses. Currently, the aforementioned stakeholders are engaging in unsustainable activities. It is promising that Awuzie and Emuze (2017) and Statistics South Africa (2019) provided evidence that on paper, South Africa and Brazil are actively engaged in SD initiatives. However, Climate Links (2016), Montmasson (2018), Nunez (2019), Petterson (2016), Teixeira (2019), and

Timperley (2018) provided opposing evidence that suggests this is not the case in practice. In short, engagement does not mean the effective implementation and achievement of set goals.

According to Statistics South Africa (2019), South Africa was an early supporter of the 2030 Agenda for SDGs. Furthermore, Awuzie and Emuze (2017:1178) noted that South Africa plays a leading role in Africa in adopting the 17 SDGs. Consequently, countries, businesses, and HEIs have promulgated legislation, strategic frameworks, policies, and vision and mission statements in line with the Agenda for Sustainable Development. However, in practice, the promulgated legislation and strategies continue to yield poor implementation, as they do not contain a guide to the attainment of South Africa's SD aspirations (Awuzie & Emuze, 2017:1179). Consequently, South Africa and Brazil have remained grounded in engrained unsustainable activities (Montmasson, 2016). In addition, South Africa and Brazil struggle with the implementation of effective economic and social practices (Civil Society Working Group for the 2030 Agenda, 2020:4).

An increase in greenhouse gas emissions and the use of resources (fossil fuels) and scarcity of fresh water sources are concerning for South African citizens (Climate Links, 2016; Petterson, 2016). Meanwhile, deforestation, heat-trapping gases, and greenhouse emissions are red flags in Brazil (Timperley, 2018; Teixeira, 2019). Nunez (2019) warns that an increase in the emissions of greenhouse gases creates global warming and contributes to climate change. Climate change in South Africa and Brazil poses a threat to prosperity, which could exacerbate inequality, poor economic growth and force many people into poverty (The World Bank, 2021a). Failure to conduct research on and effectively implement ESD in HEIs may result in the exacerbation of existing problems and the emergence of the new ones. Furthermore, the South African and Brazilian governments, organisations, and citizens struggle with the implementation of economic and social SD. Poor economic growth and high unemployment rates have contributed to high poverty levels in South Africa. As is evident, 13.6 million South Africans live in extreme poverty (Statistics South Africa, 2019). In Brazil, inequality has increased, and poverty has risen from 6.4% to 6.6% in 2020 (Civil Society Working Group for the 2030 Agenda, 2020:8). In addition, in 2018, 37% of the population did not have access to sanitation, and 28% did not have access to education (Civil Society Working Group for the 2030 Agenda, 2020:9).

It is clear from the reviewed literature that strategies on sustainability are accessible to universities to help them understand and incorporate SD in their education activities and practices. However, the adoption of a strategy to achieve sustainability does not imply the implementation of the strategy (Awuzie & Emuze, 2017:1179). Marques et al. (2018:43) affirmed that the attitudes and actions towards ESD of HEIs can serve as an example to other organisations and citizens. However, HEIs do not offer concrete steps to follow at an

operational level as to what universities and other organisations should do in order to implement ESD. Furthermore, it is evident that South African and Brazilian HEIs, citizens, businesses, and government struggle to implement ESD in their curriculum, research, and daily lives. Consequently, negative ramifications continue to exist, such as unsustainability, social injustice, poverty, and climate change.

1.5 Research gaps

Nhkoma (2018:62) identified the ever-changing nature of sustainability and the environment as a gap in his research on how best practice in sustainability procurement is reflected in the South African mining industry. Similarly, Hensley (2017:2) noted that sustainability does not end once certain specifications have been met; sustainability is a continuous cycle. Consequently, research about sustainability should also be ongoing and be updated regularly (Marques et al., 2018). In addition, it is important for students and educational institutions to understand current environmental, social and economic challenges and to be presented with different approaches to consumption of resources and the achievement of equal opportunities for all (Hensley, 2017:2). Furthermore, a lack of awareness and outdated information about environmental, social and economic issues lead to irresponsible consumption, unsustainable decisions and destroy the potential of sustainable stewardship of economic and societal development (Hensley, 2017:3).

Fehiner (2019:19) highlights that in the past decade, the concept of ESD has become a significant educational initiative to address global challenges. However, the attention was mainly dedicated to primary and secondary education. Research exploring ESD in higher education was not prominent (Fehiner, 2019:19). Fehiner also notes that the main focus on primary and secondary education has also averted academic attention from research exploring the relationship between higher education and SD. Academic dialogue about ESD in HEIs has only recently gained momentum.

Rampasso et al. (2020:2) recommended that more studies be conducted to analyse ESD in Brazilian HEIs. Most studies focused on the implementation of sustainable practices (saving electricity and recycling) instead of the implementation of ESD in the curriculum, research, and extension activities. In addition, Novo-Corti et al. (2018:819) inform that global research trends in sustainability do not align with the perspective of UNESCO. The same authors note that research into the environmental dimension of sustainability is dominating research, and less attention is given to the implementation of ESD.

It is fair to state that if ESD nurtures sustainable way of thinking as well as sustainability-oriented values and competencies. Thus, ESD has the potential to develop sustainable graduates and, in turn, improve economic and social conditions, more research needs to be conducted on how HEIs can best implement sustainable practices in their daily operations.

1.6 Research questions

The following overarching research question emerged from the earlier-identified issues and gaps in the existing scholarly literature: How effectively do higher education institutions in South Africa and Brazil implement Education for Sustainable Development? The following subquestions refer to HEIs in the two contexts under investigation.

1.6.1 Research subquestions

- i. How much emphasis is dedicated to sustainable development in the mission and vision statements as well as in other strategic planning documents of higher educational institutions?
- ii. How do the curriculum, research and learning practices at higher educational institutions align with the principles of sustainable development?
- iii. How do higher educational institutions implement sustainable practices and sustainable development in extension activities in education?
- iv. How can South African and Brazilian higher educational institutions maximise the implementation of education for sustainable development?

1.7 Research purpose

Daaboul (2017) and Thomson (2014) define a research purpose as a statement that decides the general direction and focus of the study. In line with this definition, the purpose of this qualitative study was two-fold: first, to systematically examine relevant documents to explore the effectiveness of HEIs in South Africa and Brazil in implementing ESD; and second, to make recommendations for how HEIs in both contexts can maximise the implementation of ESD.

1.7.1 Research objectives

Daaboul (2017) differentiates between the purpose of the research and the research objectives. The purpose of this research was used to dictate the general direction of the study, whereas the research objectives determined the specific aims or focus of the study. According to Lyons (2017) and Van De Water (2020), the research objectives navigate all aspects of the research

design, methodology, data collection, and data analysis. Thomson (2014) defines research objectives as specific steps that are followed to achieve the purpose of the research. Furthermore, a research study usually consists of more than one objective that describe how the research is to achieve its purpose. To this end, the research objectives for this study can be conceptualised as detailed steps that were followed to achieve the overall purpose of this research and to answer the research question and subquestions.

The purpose of this qualitative study was achieved through pursuing the following objectives:

- to determine the emphasis dedicated to sustainable development in the mission and vision statements as well as in other strategic planning documents of higher educational institutions;
- to evaluate the alignment of the curriculum, research practices and learning practices at higher educational institutions with the principles of sustainable development;
- to evaluate the implementation of sustainable practices and sustainable development in extension activities in education;
- to identify ways South African and Brazilian higher educational institutions can maximise the implementation of education for sustainable development.

1.8 Research design and methodology

According to Tie et al. (2019:1), a research design is a systematic plan utilised by researchers to answer the research questions of a particular study. In addition, the research design serves as a plan consisting of steps and strategies that researchers consider before undertaking research (Tabe, 2015). In the current study, a qualitative approach was adopted. According to Leedy and Ormrod (2019), a qualitative approach is utilised to attain an understanding about the complexity of a phenomenon. Additionally, qualitative research aims to understand a phenomenon from the participants' perspective or may be used to evaluate the effectiveness of policies, practices, and innovations (Leedy & Ormrod, 2019). A qualitative document analysis approach was followed in this study to evaluate the effectiveness of South African and Brazilian HEIs in implementing ESD.

Daniel (2016:93) explored the effectiveness of qualitative research in answering research questions. The findings of Daniel's study led the researcher in the current study to conclude that a qualitative method was the best method for the purpose of this research study for three reasons. Firstly, qualitative research provides detailed descriptions of real-life situations – thus, detailed descriptions were provided regarding the effectiveness of South African and Brazilian HEIs in implementing ESD. Secondly, qualitative data are unique, as such data consider human

behaviour in a social context as well as a variety of phenomena to generate understanding. Lastly, qualitative data collection and analyses allow researchers to generate theory, which, as will be explained later, this research study achieved. The same author noted that qualitative research methods also have limitations (Daniel, 2016:94). The findings of qualitative research are limited to a certain group and cannot be generalised to groups that were not under study.

In addition, in this study, a comparative method was followed which adhered to three recommendations that researchers should consider when employing a comparative method (Esser & Vliegthart, 2017:1; Mugo & Wolhuter, 2013:3; Piovani & Krawczyk, 2017:823). Firstly, equivalence should be ensured when collecting data that are comparable between different contexts (Esser & Vliegthart, 2017:1). The state of one or more objects (country or institution) should be compared, using at least one common property, which is also known as a contextual condition (Piovani & Krawczyk, 2017:823). In addition, biases should be avoided when purposefully sampling documents (Esser & Vliegthart, 2017:1). Secondly, comparative research differs from non-comparative studies, as it tries to clarify the differences and similarities between the objects under investigation and relationships between the objects, taking into consideration their contextual conditions (Esser & Vliegthart, 2017:2). Mugo and Wolhuter (2013:3) claim that knowing that differences exist between education systems is not enough; researchers should examine contextual conditions of countries and uncover why differences exist. In this study, the researcher explored the differences and similarities in the implementation of ESD in South African and Brazilian HEIs against the backdrop of the contextual conditions in these countries. Lastly, the comparison, conceptualisations along with data collection, and data analysis techniques were grounded in the following theoretical framework.

1.9 Theoretical framework

This study did not start with a specific theory in mind. However, following the principles of a grounded theory approach, an attempt was made to identify an emergent theory grounded in data (Nieuwenhuis, 2020:87; Strauss & Corbin, 1990). According to Nieuwenhuis (2020:87), in a qualitative study, one does not begin with theory to test and verify. Instead, consistent with the inductive model of thinking, a theory may emerge during the data collection and analysis phase. It may also be used relatively late in the research process as a basis for comparison with other theories. As is evident in the scholarly literature, in qualitative research, theoretical frameworks may emerge when analysing data in order to reduce the biased views the researcher may have when reporting the research findings (Grant & Osanloo, 2014:16; Grounded Theory Online, 2021). To that end, this qualitative document analysis study followed the principles of grounded theory (Strauss & Corbin, 1990). According to Noble and Mitchell (2016:34) and Tie et al.

(2019:3), grounded theory involves development of theory based on data that have been thoroughly selected and analysed methodically. Bowen (2009:34) explained that most grounded theory studies use interviews and observations; however, a study that uses only documents can also be driven by grounded theory as theoretical framework. Grounded theory is discovered, developed and subsequently confirmed through the organised collection and analysis of data. In grounded theory research, the researcher is the main instrument of data collection and analysis. For this study, the researcher followed systematic procedures during the data collection and analysis phase, which relied on the creation of open codes, axial codes, and selective codes (Creswell, 2009).

1.10 Research paradigm

Perera (2018) defined a research paradigm as a set of mutual beliefs shared by scientists about how research problems should be understood, and which approaches should be employed to address the problem. Furthermore, researchers reflect on their philosophical views and analyses of the world before conducting a research study (Tie et al., 2019:1). This was an exploratory qualitative study with a postmodern research perspective. Nieuwenhuis (2020:61) noted that most qualitative research studies are exploratory in nature and aim to attain a better understanding of a topic, group, process, or setting. In the case of this study, the *topic* was sustainability, the *group* consisted of South African and Brazilian HEIs, *process* referred to the implementation of ESD and *setting* to higher education. Nieuwenhuis (2020:61) also contends that exploratory research does not start with a fixed theoretical framework but rather tries to identify an emerging theoretical framework when analysing data. Therefore, a researcher who adopts this philosophical paradigm does not have a single perspective but believes that multiple realities exist (Forghani et al., 2015:101; Hossienia & Khalili, 2011:1311).

1.11 Data collection

Data collection refers to the methods used by researchers to collect information for the purpose of their research. During the process of data collection, limitations are set for the study, and steps to collect and record information are outlined (Creswell, 2009). For the purpose of this study, document analysis was employed to collect data. Considering the limitations of gathering data in person due to Covid-19, an informed decision was taken to employ document analysis as the research method in this study. According to Creswell (2009), document analysis saves time, and documents (strategic frameworks, research reports, and vision and mission statements) can be collected and analysed when it is convenient for the researcher. Furthermore, the collection and analysis of data occurred concurrently, as recommended by the principles of grounded theory (Noble & Mitchell, 2016:34; Schneider et al., 2017:372).

As indicated by Yavuz (2016:119), in order to undertake document analysis, relevant data must be accessible. In this study, freely available public documents were utilised as data sources. Sixty documents were purposively collected to address the research questions and achieve the objectives of the study. The collected documents included strategic frameworks, research reports, journal articles, institutional development plans, teaching and learning reviews, sustainability management plans and reports, and vision and mission statements from the years 2015–2021. In order to make the process manageable, the institutional documents came from eight universities in South Africa and eight universities in Brazil. Meanwhile, journal articles as data sources were selected from international journals focused on sustainability in higher education. The HEIs selected in each context were those with predispositions to implement ESD in their academic activities.

1.12 Sampling methods

Amonashvili (2011:24), Creswell (2013) and Foley (2018) identify two types of sampling methods that can be utilised in document analysis. The first method involves selecting a compilation of relevant documents and then randomly selecting a desired number for analysis (probability sampling). There is a risk, however, that a random selection of documents may result in inconclusive and inconsistent findings. The second method, known as purposive sampling (non-probability or subjective sampling), relies on purposefully selecting documents for analysis. Creswell (2013) recommends the use of purposive sampling methods when conducting a qualitative study, as they allow researchers to uncover accurate answers to their research questions and ultimately attain a better understanding of the phenomenon under investigation. In line with the recommendation made by Creswell (2013), the purposeful sampling method was employed in this study.

1.13 Data analysis

According to Creswell (2009), in a qualitative study, data analysis involves preparing data for analysis, conducting different analyses, and attaining a deeper understanding of the collected data. As recommended by Creswell (2009), data analysis was ongoing, which involved reflecting on data, asking analytical questions, and writing memos throughout the collection and analysis of the data. The researcher made sense of the data through open coding, axial coding, and selective coding. The research design and the data collection technique followed the principles of grounded theory.

Furthermore, coding as a qualitative data analysis method is used to understand data in relation to the research questions of a study. Similarly, coding is used to make sense of, comprehend

and systematically analyse the data and finally share the findings (Elliot, 2018:2851). In addition, the overall aim of data analysis in grounded theory is theory development, which is achieved through a thorough coding process (Elliot, 2018:2850). Basit (2003:145) recommends the use of electronic colour-coding, as innovative researchers often utilise it. A detailed and systematic e-colour-coding process of the text was followed to code the selected documents for the purpose of this study. Once documents were collected, the relevance, credibility and date of the documents were used as criteria to evaluate their contribution. After the selected documents met the aforementioned criteria, open coding commenced immediately, as the principles of grounded theory recommend that the collection and analysis of data occur concurrently (Noble & Mitchell, 2016:34; Schneider et al., 2017:372). Subsequently, with data saturation and theoretical sampling in mind, the aforementioned process of collecting and analysing data simultaneously informed the researcher which gaps existed and which type of documents had to be collected next.

Data saturation is conceptualised as the point where all themes and categories have been examined to such an extent that no new data are forthcoming (Saunders et al., 2017:1895). A detailed research journal tracked all decisions made by the researcher, reasons for conducting specific internet searches, keywords, and the reasons for selecting or not selecting a document. The researcher initiated the coding process with open coding, followed by axial coding and continued with selective coding in order to develop theory.

1.14 Trustworthiness

Scholarly literature (Devault, 2019; Gunawan, 2015; Nieuwenhuis 2020:144) outlines four aspects that can be utilised to ensure trustworthiness of a qualitative study: credibility, transferability, dependability, and confirmability. Korstjens and Moser (2018:121) view credibility as the extent to which the research findings are truthful and believable, while transferability denotes how the research is relevant in other contexts. If another researcher analyses the raw data and the same findings are uncovered, the research can be deemed dependable (Korstjens & Moser, 2018:121). Gunawan (2015:10) stated that dependability is not always achievable or necessary in qualitative studies because most qualitative studies are based on the premise that reality and knowledge are multiple. Thus, new research may not yield the same conclusions as the original research. Therefore, in this qualitative study, dependability was not used to ensure the trustworthiness of the research. Confirmability refers to the extent to which the researcher has interpreted the research findings in a neutral and unbiased manner from the raw data (Devault, 2019). According to Gunawan (2015:10), a research study is trustworthy and credible only if the reader of the report deems it to be the case.

As advised by Devault (2019) and Nieuwenhuis (2020:144), the following steps were undertaken to ensure the credibility, transferability and confirmability of this qualitative study. Firstly, credibility of the findings was assured through the use of rigorous research methods and a transparent report of data collection and data analysis. The collection and analysis of the data aligned with the research questions, objectives and theoretical framework, which also contributed to the credibility of the findings. Secondly, transferability of the research was made clear by grounding it in different contexts. As indicated earlier, the purposefully collected documents were used to explore ESD in South African and Brazilian HEIs. The research provided rich, detailed descriptions and avoided generalisation, simultaneously showing the relevance of the phenomenon (ESD) in different contexts. Lastly, the researcher assured confirmability diligently following the reported research design, adhering to ethical standards and by keeping track of all decisions and thoughts in a research journal.

1.15 Organisation of the research report

The research report is divided into five chapters. The first chapter provided an overview of the study, explored the background context, problem statement, research questions, research objectives, and research design. A comprehensive literature review on ESD is comprehensively presented in chapter 2. Chapter 3 thoroughly describes the research design as well as the research methodology and methods that were employed in this study. Chapter 4 showcases empirical data analysis using grounded theory research methods and the findings that emerged from the document analysis. Finally, chapter 5 provides a summary of the study, discusses the limitations and emerging theory, and recommendations are made to various stakeholders.

1.16 Contribution of the study

First, this study makes a contribution to the field of Comparative and International Education, as the effectiveness of South African and Brazilian HEIs in implementing ESD was explored. Second, the study fills the gap in the existing scholarly body of knowledge on higher education for sustainable development (HESD). Leading ESD organisations such as UNESCO have emphasised the need for more research on ESD. Although ESD has been researched extensively in elementary and secondary education, research on ESD in higher education was neglected (Fehiner, 2019). Also, South Africa's president, Cyril Ramaphosa, during his address at the virtual Summit on Biodiversity, called on citizens and businesses to continue to prioritise environmental, social and economic sustainable practices, especially during the coronavirus pandemic (News24, 2020; South African Government News Agency, 2020). Thus, this research project added to the scarce body of knowledge on ESD in the two contexts under investigation and in doing so, heeded the calls of South Africa's president. To that end, this qualitative study

zoomed in on the implementation of ESD in HEIs in South Africa and Brazil as both countries are developing nations and are part of the BRICS member states. Comparing Brazil and South Africa as opposed to other BRICS nations makes a unique contribution to the scarce body of scholarly literature as the implementation of ESD in Brazil and South Africa is understudied. Third, answering the research questions is meant to inform the selected HEIs which areas of their institution (research, vision and mission statement, teaching, extension activities and curriculum) call for development and further research. Subsequently, the successes and shortcomings of the implementation of ESD in HEIs can be enhanced.

Lastly, the research results could contribute to the effective implementation of ESD by other institutions. In turn, the above-mentioned contributions could maximise the successful fulfilment of the 17 SDGs. In short, the findings of this work are meant to serve as an example to other institutions as to the practices and strategies to successfully implement ESD. Based on the results of this study, recommendations are made that may be useful to educational leaders, educators, researchers, and policymakers.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

As is evident in scholarly literature, countries globally are facing unprecedented challenges, leaving citizens feeling vulnerable. Political conflicts pose a threat to peace and democracy, which has increased the number of refugees globally (Fehlner, 2019:18). Climate change has created potentially permanent environmental consequences which have expanded the disparity in income distribution and forced millions of citizens into poverty (Brodowski, 2017:841; Fehlner, 2019:18). As a response to the challenges of the 21st century, countries globally have committed to the UN 2030 Agenda for Sustainable Development. Propelled by the UN 17 SDGs, Agenda 2030 seeks to integrate development, peace, social justice, and human rights (Ferguson & Rooft, 2020:959; Zermeno & De la Garza, 2020:345). The 17 SDGs protect and promote the interest of the most vulnerable citizens and ensure that no one is left behind. The commitment of the UN member states creates opportunities for vulnerable citizens who face challenges such as conflicts, diseases, natural disasters, and unstable political environments (Zermeno & De la Garza, 2020:345).

Education plays a pivotal role in the development of society's capability to overcome the most pressing challenges of the 21st century (Brandt et al., 2019:631; Brodowski, 2017:841; Da Silva et al., 2019:228). Consequently, the UN member states have identified education as a fundamental instrument that nations can employ towards the social, economic and environmental emancipation of countries (Novo-Corti et al., 2018:818). More specifically, now more than ever, HEIs need to contribute to overcoming the challenges of the 21st century (Brodowski, 2017:841), as they provide the optimal setting and resources to promote SD (Zermeno & De la Garza, 2020:347). Avila et al. (2017:1270) noted that through sustainability-related research, teaching and extension activities, HEIs could improve conditions within society, the economy, and the environment. HEIs are expected to play a pivotal role in nurturing graduates that aim to inclusively develop society and improve the well-being of the planet and that of its inhabitants without depleting natural resources (Solera & Laya, 2017:279). Therefore, citizens, institutions and academics globally have called for initiatives that support the transformation of HEIs' curriculums, objectives and actions towards sustainability (Mula et al., 2017:799). Their call has been answered, as HEIs have shown considerable commitment and progress towards sustainability through international dialogue, technology, conferences, teaching and learning, research, strategic planning, and signing of declarations (Farinha et al., 2020:467; Mula et al., 2017:799). Novo-Corti et al. (2018:818) and Zermeno and De la Garza (2020:347) noted that although necessary for initial change, the long-term goal of sustainability

is not only achieved through the dissemination of knowledge, technological innovation, economic resources, and policies. A shift in citizens' mentality is necessary to live and work in a way that supports a healthy and just global society. The effective implementation of ESD has proved to have a positive impact on the sustainability consciousness of students (Novo-Corti et al., 2018:818). Thus, it is no surprise that scholarly literature has identified ESD as the method with the most potential to change the mentality of citizens, nurture sustainability-related competencies, and achieve the long-term goal of sustainability (Novo-Corti et al., 2018:818). ESD is a lifelong learning process (Kieu et al., 2016:853) that entails transformative teaching and learning methods, as opposed to traditional approaches. ESD aims to instil skills, knowledge, attitudes and values that will enable students to live and work in a sustainable manner. In other words, ESD requires a type of teaching and learning that promotes SD through critical thinking (Lu & Zhang, 2013:49). As is evident in scholarly literature (Lu & Zhang, 2013:58), ESD should be encouraged by the formal curriculum (teaching and learning) and consolidated by the informal curriculum (campus greening and extracurricular activities).

Considering the critical role HEIs play in the achievement of the UN's 17 SDGs and in protecting vulnerable habitats and citizens, it is concerning that many HEIs do not fully understand the true nature of sustainability (Mula et al., 2017:799). Consequently, HEIs globally are experiencing poor implementation of ESD (Mula et al., 2017:800). Mula et al. noted that while this trend continues, graduates are taking up responsibilities in society with inadequate understanding of the principles of sustainability. The tertiary education experiences of graduates may give insight into sustainability but fall short of capturing a deeper, interconnected understanding of the principles of sustainability. As a result, their cultural assumptions and professional practices perpetuate the exploitation of people and the planet (Mula et al., 2017:799).

This chapter addresses the topic of HESD in several countries, with special attention paid to the contexts of South Africa and Brazil. To be clear and informative, the literature review was divided into four main sections. The next section (§ 2.2) elaborates on the importance of conceptualising sustainability-related terms to prevent confusion and misconceptions. Section 2.3 then discusses HESD and the important role HEIs play in the attainment of SDG 4. Subsequently, the same section explores the progress towards the attainment of SDG 4 in the contexts of South Africa and Brazil. Section 2.4 discusses HESD in developing countries, highlighting the progress of South Africa and Brazil. The last sections of this chapter (§ 2.5 and 2.6) uncover challenges and opportunities pertaining to the effective implementation of ESD grounded in a global context, followed by a summary of the literature-review section (§ 2.7).

2.2 Conceptualising sustainability-related terms

The reviewed scholarly literature highlighted four misconceptions when conceptualising sustainability-related terms, which, if not addressed, could negatively affect the implementation of ESD. Firstly, the terms *sustainability* and *sustainable development* do not have unanimous definitions. In addition, the terms have different meanings in sociology, ecology, and economics (Barbosa et al., 2014; University of Nottingham, 2021). Secondly, the terms are often used interchangeably. However, Da Silva Junior et al. (2018:5) note that the terms have different meanings and thus should not be regarded as synonyms. Thirdly, the dual nature of the concept of SD often adds to the confusion (Ciegis et al., 2009:29) created by the three dimensions (social, economic, and environmental) on which sustainability and SD are based (Ketschau, 2015). Lastly, different, and even opposing, views exist about what development entails and what criteria should be met for development to be classified as sustainable (Solera & Laya, 2017:280).

According to Da Silva et al. (2019:238), a lack of understanding of the concept of sustainability is leading to poor implementation. On the same note, Tierney et al. (2016:510) add that inconsistent definitions and misconceptions also hinder the successful implementation of ESD. Therefore, educational leaders should clearly define sustainability-related definitions and address the above-mentioned misconceptions.

2.3 Higher education for sustainable development

Primary and secondary education has an important role to play in sustainability; however, the roles of HEIs are also critical (Fehlner, 2019:19; Ferguson & Roofe, 2020:960; Zermeno & De la Garza, 2020:346). Farinha et al. (2018:913) claim that HEIs have a responsibility to ensure that future leaders understand the needs of the present and the future better. This responsibility is delegated to HEIs because they are meant to educate professionals who will take up leadership positions within society and, ideally, who will have the potential to incorporate sustainability into their organisations' operations (Farinha et al., 2018:913; Lozano et al., 2013:2; Novo-Corti et al., 2018:820; Solera & Laya, 2017:279). In addition, the commitment of HEIs to sustainability is expected to serve as an example to other citizens and institutions (Ferguson & Roofe, 2020:600; Novo-Corti et al., 2018:821).

Measuring the extent to which HEIs contribute to society has been challenging; however, recent scholarly literature indicates that HEI graduates are more productive and better equipped for challenges in a globalised knowledge society for three reasons (Farinha et al., 2018:913; Fehlner, 2019:913). Firstly, through teaching, human capital is developed and citizens become

more productive. The acquired knowledge, skills and competencies enable them to work in a digitalised and innovative society (Farinha et al., 2018:933; Fehlner, 2019:20). Consequently, citizens are more informed and thus prepared to make sustainable decisions. In addition, they become better positioned financially, which enhances their quality of life and promotes economic growth of their countries. Secondly, research on SD has the potential to contribute to sustainability through innovation and new technologies, which also maximises productivity, economic growth, consumption methods, and the standard of living for citizens (Farinha et al., 2018:913; Fehlner, 2019:20). Lastly, SD in extension activities enables HEIs to directly engage with society, which could positively impact demographic trends, health, environmental awareness, and responsible behaviour. Simply put, through extension activities, HEIs have the potential to improve nutritional habits and hygiene, and encourage responsible social, environmental and economic behaviour, which, as a result, may improve family planning and encourage inclusion (Fehlner, 2019:23). To this end, HEIs have a responsibility to utilise their resources, research, staff and students to benefit the communities that host them (Ferguson & Roofe, 2020:600; Thomas, 2020:899).

According to Kieu et al. (2016:855) and Mandikonza and Lotz-Sisitka (2016:108), HEIs in developing countries (such as South Africa and Brazil) have a key role to play, as many developing countries are vulnerable to natural disasters and complex social issues such as poverty and inequality. However, the reality in many developing countries is that ESD is only starting to gain academic momentum (Solera & Laya, 2017:279). Kieu et al. (2016:854) noted that ESD has shown promising progress in the education systems of developing countries but has not achieved satisfactory progress. Progress is hindered by weak tertiary institutions, inadequate financial and human capital, and a lack of prioritisation for ESD in the curriculum and teacher training programmes (Kieu et al., 2016:854). A further concern reported by the authors is that ESD-related research publications from developing countries are low compared to developed countries. This further complicates the implementation of ESD in developing countries. A multifaceted process is essential to proceed from promoting the term sustainability to changing the attitudes and actions of citizens to achieve it. Such a process would necessitate vision, policy and funding, which has proven difficult for developing countries (Kieu et al., 2016:855).

2.3.1 Higher education for sustainable development: SDG 4

ESD has been reinforced by the UN SDG 4, as it focuses on inclusive, equitable, quality, lifelong education (Farinha et al., 2018:915). Rampasso et al. (2020:1) noted that ESD is linked to quality education (SDG 4), as stated in target 4.7; thus, education should be utilised to develop knowledge and values that enable action towards SD. Ferguson and Roofe (2020:962)

reported that target 4.3 pays special attention to HEIs, as this target's aim is to have equal access to HEIs (technical, vocational and tertiary education) for men and women by 2030. In addition, the realisation of SDG 4 is critical, as it has the potential to contribute to the achievement of the remaining 16 SDGs (Ferguson & Roofe, 2020:960; Rampasso et al., 2020:1). Yet, it is concerning that the realisation of the SDGs in many HEIs is in the initial stage. A further concern is that HEIs need to redeploy their strategy towards the inclusion of women and marginalised groups, especially in countries located in the Sub-Saharan African and the South Asia region (Ferguson & Roofe, 2020:963).

An observation in reference to the Brazilian context is that HEIs have a unique opportunity to develop problem-solvers and decision-makers that would balance social, economic and environmental needs when making decisions at their places of employment (Ferguson & Roofe, 2020:963; Rampasso et al., 2020:2). Consequently, students need a profound understanding of the SDGs and the steps that should be taken to attain them (Ferguson & Roofe, 2020:963). Furthermore, none of the SDGs can be achieved without HEIs being utilised as avenues through which citizens develop competencies to advance society (Ferguson & Roofe, 2020:963; O'Malley, 2019). However, the opportunity to direct citizens on a sustainable path does not come without challenges for HEIs (Ferguson & Roofe, 2020:964).

HEIs face three challenges which may hinder their success in successfully implementing ESD and ultimately achieving the UN 17 SDGs (Ferguson & Roofe, 2020:965; Kieu et al., 2016:855; Lu & Zhang, 2013:54; Moosa, 2020; Organisation for Economic Co-operation and Development [OECD], 2018, 2019; O'Malley, 2020; Society of Women Engineers, 2021; Thomas, 2020:900). The first challenge is grounded in the traditional, isolated operational approach HEIs follow when teaching and conducting research to innovate and solve societal problems (Ferguson & Roofe, 2020:965; Kieu et al., 2016:855; Lu & Zhang, 2013:54; Thomas, 2020:900). The SDGs are interlinked – thus, one goal cannot be achieved without the other. Similarly, one level of education affects the other. HEIs need to share their power and prestige with other stakeholders at lower levels to have the most co-ordinated efforts to achieve SDG 4 at all levels (Ferguson & Roofe, 2020:965). Ferguson and Roofe (2020:966) proposed that stakeholders working and partaking in the management, teaching and learning at HEIs understand the role of HEIs in achieving SDG 4 and be part of the discourse on and action towards its realisation. The second challenge towards the realisation of SDG 4 and the remaining SDGs lies in unequal access to HEIs between developed and developing countries (Ferguson & Roofe, 2020:966).

In addition, equal access to HEIs for both men and women needs to be addressed by increasing the number of women enrolled in the vocational sector – this may improve their employability (OECD, 2018). The challenge for HEIs in this regard is twofold: on the one hand,

HEIs need to expand and diversify their courses to overcome traditionally held perceptions about women in the world of work; on the other hand, HEIs need to develop strategies to improve their completion rates of both men and women. However, it is important to note that women are more likely to complete their studies than men. As is evident from South African literature (Moosa, 2020), in 2017, 844 more women completed their studies than men at the University of Witwatersrand. In 2016, the University of Cape Town experienced similar trends, as 285 more women completed their studies than men. In addition, the trend of more women graduating than men is prevalent nationally at South African HEIs. It is also important to note that men have higher enrolment rates in postgraduate courses than women (Moosa, 2020). Meanwhile, Brazilian women made up more than half of the total enrolments in Brazilian HEIs in 2016 (Society of Women Engineers, 2021). Similarly, Brazilian women are 42% more likely to have attained tertiary education than men; however, women are less likely to be employed (OECD, 2019). Lastly, the aforementioned challenges necessitate bold actions and funding, which is a longstanding issue, especially in HEIs of developing countries (Ferguson & Rooft, 2020:966; O'Malley, 2020).

Scholars (Da Silva et al., 2019:238; Ferguson & Rooft, 2020; O'Malley, 2020; Tierney et al., 2016:510; UNESCO, 2019d:78; United Nations, 2017) suggest that HEIs consider four avenues of potential opportunities towards the implementation of ESD and the attainment of the SDGs (Ferguson & Rooft, 2020). The first opportunity is to ensure students, staff and stakeholders have a clear understanding of what SD means and their part in working towards it (Ferguson & Rooft, 2020:964; Da Silva et al., 2019:238; Tierney et al., 2016:510). A starting point should be to conduct a baseline assessment of students' and staff's sustainability knowledge. The Sustainability Literature Test can be utilised, as it is a globally trusted open online assessment training and assessment tool meant to measure sustainability knowledge and to create awareness (Ferguson & Rooft, 2020:964; United Nations, 2017). Once the sustainability knowledge of students and staff has been assessed, strategies for achieving objectives can be set. The second opportunity is grounded in increasing the number of skilled educators HEIs develop, as there is a need for competent educators globally (Ferguson & Rooft, 2020:964; UNESCO, 2019d:78). HEIs in developed and developing countries could seek to collaborate with one another (through teaching, learning, and research) which may contribute to the skillset in developed and developing countries (O'Malley, 2020). Collaboration is necessary to attain funding for infrastructure, especially in developing countries. Educators who are knowledgeable about the SDGs would be in position to expose their students to SDG-related activities, skills, attitudes, and values. In turn, students would have the capacity to model sustainability competencies within their communities. The third opportunity requires the reorientation of teacher training programmes to incorporate sustainability-related knowledge, skills, attitudes,

and values. Teachers and teacher educators have the potential to be influential agents of change if they are empowered to do so (Ferguson & Roofe, 2020:964). Educators concerned with the well-being of the planet and all its inhabitants have a higher capacity to facilitate quality education and to contribute to the achievement of the SDGs (Ferguson & Roofe, 2020:965). Ferguson and Roofe note that the most rapid transition to sustainability would occur if educators and students in Faculties of Education are reoriented towards sustainability. The last opportunity stems from the realisation that HEIs are in a position to solve social problems, innovate and increase access to education (Ferguson & Roofe, 2020:965).

2.3.2 South African and Brazilian path trajectory towards SDG 4

Recognising the important role HEIs play in the attainment of SDG 4 and the remaining SDGs, this subsection explores the path trajectory of South Africa and Brazil towards the realisation of SDG 4 and its targets. Special attention is paid to target 4.3, which aims to create equal access to HEIs for all citizens.

Brazil is faced with three challenges hindering progress towards the attainment of SDG 4 and its targets. Firstly, budget cuts have made free education for all Brazilian citizens unlikely (target 4.1). Secondly, legislation such as the National Education Plan is poorly implemented, and new legislation such as the Supplementary Law Bill 39/2020 does not promote SDG 4, as it makes provision for the appointment of new teachers if they do not increase expenses (Civil Society Working Group for the 2030 Agenda, 2020:16). Lastly, there is a lack of reporting, statistics, data and current research evaluating Brazil's progress towards SDG 4 (Civil Society Working Group for the 2030 Agenda, 2020:16).

Progress towards free primary and secondary education (target 4.1) is insufficient, as 90 000 children between the ages of six and 14 do not attend school (Civil Society Working Group for the 2030 Agenda, 2020:16). Furthermore, enrolment of children under the age of three in pre-primary education has improved from 10% to 23% between the years 2012 and 2017. However, this percentage (23%) remains below the OECD average of 36% (OECD, 2019:1). As reported by the Civil Society Working Group for the 2030 Agenda (2020:16), it is concerning that there is a lack of recent data, and no plans are in place to collect data on early childhood development enrolment rates, which has implications for equal access to quality pre-primary education (target 4.2).

Concerns extend from primary education to tertiary education, as only 15% of Brazilian citizens are enrolled in HEIs. Although post-schooling enrolment rates are low, on average, the Brazilian government has spent 10 times more of its financial resources on tertiary education than on

primary education (OECD, 2019:2; Pollack, 2017). Post-school education and training experienced steep budget cuts between the years 2013 and 2019 (1.17 billion to 2.46 million). This has reduced the enrolment rate in post-school education and training and has negatively affected the progress towards creating equal access to HEIs (target 4.3). According to the Civil Society Working Group for the 2030 Agenda (2020:16), poor enrolment and completion rates have reduced the potential to equip citizens with skills for financial success (target 4.4). Furthermore, Pollack (2017) noted that while tuition-free public HEIs are funded by the taxes of the poor working class, citizens from affluent backgrounds do better in entrance exams, thus gaining access to HEIs (target 4.3, 4.5). In addition, the OECD (2019:5) reported that admission to vocational programmes is selective and students from affluent backgrounds are more likely to be enrolled in vocational programmes than disadvantaged citizens (target 4.3, 4.5).

The Civil Society Working Group for the 2030 Agenda (2020:16) informs that it is difficult to report on target 4.5, as there is a lack of recent data on and research into the elimination of discrimination in education; however, historical inequalities still manifest within the Brazilian education system and society (target 4.5). Furthermore, achieving universal literacy and numeracy levels (target 4.6) by 2030 seems unlikely, as 11 million Brazilians were illiterate in 2019. In addition, the Civil Society Working Group for the 2030 Agenda (2020:16) notes that environmental education is no longer compulsory at all levels of education, which reveals Brazil's poor commitment to ESD and global citizenship (target 4.7).

Like Brazil, South Africa has to overcome historical inequalities and cope with budget cuts to ensure SDG 4 and its targets are achieved. According to the Business Tech website (2021), the budget allocated to basic education is under pressure for two reasons. Firstly, the annual budget allocated towards education decreased by 5.3% between the years 2020 and 2021. Secondly, many parents of children attending fee-paying schools do not pay school fees. Meanwhile, the Business Tech website (2021) and Griffiths (2017) reported that two thirds of the country's children attend no-fee primary schools and do not pay school fees, but those attending special schools often do (target 4.1, 4.5). In addition, the South African Government (2019:58) is aware that South Africa has one of the most unequal education systems in the world as a direct result of the apartheid system (target 4.5).

It is promising that quality education has been prioritised by South African legislation such as the NDP (South African Government, 2019:58). As is evident, 95% of the country's children are engaged in formal learning in the year before officially starting primary school (target 4.2). Moreover, 95% of South African citizens aged between 16 and 18 have passed Grade 7. Yet the dropout rates in senior grades and HEIs are high (South African Government, 2019:59).

We learn from Matsolo et al. (2018:63) that since 1994, South Africa has made tremendous headway towards improving enrolment rates in HEIs (target 4.3). Since the year 2000, enrolment rates have been increasing at an average rate of 4.2% annually. In addition, the South African government allocates a large portion (20%) of its annual budget to basic and tertiary education (Matsolo et al., 2018:63; UNICEF, 2018:4). Despite the government's commitment, South African HEIs have 1 901 tertiary education enrolments per 100 000 of the population (Nksoi, 2019). This is the lowest as part of the BRICS member states, with China at 3 104 and Brazil at 4 023 per 100 000 of their population (Nksoi, 2019; South African Government, 2019:62). In addition, South African youth (aged between 18 and 24) continue to struggle to gain admission to the post-school education and training sector (South African Government, 2019:62). In the year 2016, 2.9 million South African youth were enrolled at HEIs (Nksoi, 2019; South African Government, 2019:62). However, 3.2 million citizens in the same age group were unemployed and had not engaged in any post-school education and training, which negatively affects the number of citizens capable of financial success (target 4.4).

In terms of teaching and learning conditions, all schools in South Africa have access to drinkable water and electricity, and sustained action is being taken to improve learning and teaching conditions. However, the South African Government (2019:61) is currently concerned that South African rural schools offer teaching and learning experiences and resources that are below par (target 4.5). Promising progress has been made towards target 4.6, as almost 100% literacy levels have been reached by South African citizens aged between the ages of 15 and 64 (South African Government, 2019:59). Use of the Internet and computers for the purpose of teaching and learning in South African schools is low as compared to the international norm. As reported by the South African Government (2019:59), South Africa could seek to partner with other countries well vested in the use of technology in the classroom to develop globally competent citizens (target 4.7).

Overall, it is promising that South Africa has identified the challenges the country needs to overcome and that the country has provided possible solutions. The country intends to achieve SDG 4 and its targets by 2030 through offering diverse training opportunities, providing entrepreneurial skills training, monitoring performance, and making necessary changes in order to address the socio-economic factors hindering enrolment and completion rates in the post-school education and training sector (South African Government, 2019:62).

2.4 Higher education for sustainable development in developing countries

The challenges as regards the implementation of ESD in developing countries globally apply to the context of South Africa and Brazil (Da Silva et al., 2019; Feinstein et al., 2013; Rampasso et

al., 2020). Feinstein et al. (2013:219) noted that South African and Brazilian HEIs' progress towards the implementation of ESD is hindered by three challenges that need to be addressed. Firstly, although ESD is supported by the South African and Brazilian national governments, stakeholders in government do not have an effective influence on the promotion of ESD (Feinstein et al., 2013:219). Secondly, the implementation of ESD is hindered by a lack of infrastructure and technological tools that can assess the status of implementation of ESD (Feinstein et al., 2013:222). Thirdly, the role of ESD in the curriculum and teacher training is not clearly articulated, leading to its poor integration in HEIs across South Africa and Brazil (Feinstein et al., 2013:221). Feinstein et al. noted that one of the major factors hindering the successful implementation of ESD in South Africa and Brazil is the lack of teacher training in sustainability-related skills, knowledge, attitudes, and values.

Mandikonza and Lotz-Sisitka (2016:111) conducted a qualitative study exploring the effectiveness of a South African professional development course for educators, utilising a case study method, in the context of Rhodes University. The findings revealed that the course had the potential to transfer sustainability-related knowledge, critical thinking, and transformative teaching methods to educators (Mandikonza & Lotz-Sisitka, 2016:126). In addition, UNESCO (2013) noted that Rhodes University and the University of Cape Town have made excellent progress towards the implementation of ESD-related skills, knowledge, and values at their respective institutions. It is promising that individual South African HEIs recognise the important role educators play in ESD; however, efforts towards the professional development of educators lack collaboration and co-operation from other HEIs (Feinstein et al., 2013:221; Mandikonza & Lotz-Sisitka, 2016).

Zooming in on the Brazilian context, Rampasso et al. (2020) conducted research that aimed to analyse criteria that should be included in models to evaluate the level of sustainability in the engineering curriculum. Rampasso et al. (2020:3) noted that general guidelines for sustainability were incorporated into the engineering curriculum for Brazil; however, there were opportunities for improvement in several areas. The first area that needed improvement was interconnectedness between SD goals and strategies in different faculties. According to the authors, approaches to ESD should not be isolated in one academic faculty; instead, several academic disciplines should collaborate and work towards a holistic approach. In addition, a holistic approach should not only be local; engineering students should be exposed to global social, economic and environmental settings. Global partnerships have the potential to enhance the quest for SD by sharing competencies. The second area requiring enhancement was the lack of research on and understanding of ESD in a Brazilian context, which has resulted in Brazilian HEIs implementing sustainable practices instead of ESD (Rampasso et al., 2020:3).

However, Fearnside (2018:8) believes that more research is not enough to improve the quest towards sustainability in Brazil; instead, government and business owners need to be educated to take better decisions towards SD. Rampasso and colleagues noted that the third area requiring development is the curriculum, teaching and extension activities HEIs offer. This area requires better strategic insertion of ESD. Consequently, it is crucial that top management of HEIs be informed about and supportive of initiatives towards ESD. Nevertheless, it is concerning that top management of Brazilian HEIs do not fully support the insertion of ESD. With this concern in mind, Rampasso et al. (2020:3) made three recommendations that top management of Brazilian HEIs should consider to effectively implement ESD. Firstly, critical thinking, real-life problem-solving and innovation need to be at the heart of ESD. Critical thinking and innovation are prerequisites to acquiring knowledge and changing behaviours towards sustainability and thus deserve inclusion in the curriculums of HEIs. Secondly, sustainability is a dynamic, ever-changing topic which requires the material, training and curriculums to be flexible and constantly updated. Lastly, educators in HEIs need to be informed about and trained on their role and responsibilities towards SD. The last area calling for improvement is the participation of students in extension activities geared towards SD, which will facilitate a profound understanding of social issues. Furthermore, the three dimensions of sustainability (social, economic, and environmental) have not received equal attention in Brazilian HEIs; the environmental aspect has received greater attention (Rampasso et al., 2020:3).

2.5 Challenges with the implementation of ESD

Based on the review of the scholarly literature, it is evident that the implementation of ESD comes with challenges and requires preparation of educational leaders, academics, and educators. The successful implementation of ESD will depend on the extent to which the challenges towards ESD are identified and addressed (Novo-Corti et al., 2018:823). After analysing the scholarly literature (Avila et al., 2017; Brodowski, 2017; Da Silva et al., 2019; Farinha & Caeiro, 2018; Farinha et al., 2020; Grindsted, 2011:29; Kieu et al., 2016; Lu & Zhang, 2013; Mula et al., 2017; Novo-Corti et al., 2018; Padayachee et al., 2018:290; Rampasso et al., 2020; Takala & Korhonen-Yrjanheikki, 2019; Thomas, 2020:900), each article revealed different yet pressing challenges that HEIs face when implementing ESD. In addition to the challenges, scholars provided recommendations to stakeholders (management, academics and educators) in HEIs to consider when addressing challenges towards the implementation of ESD. Next, 10 challenges are identified and addressed along with recommendations made by the aforementioned scholars.

The first reported challenge is the lack of a holistic vision and integrated approaches to innovation and sustainability (Avila et al., 2017:1270). UNESCO recommends the use of a whole-institution approach, which entails an integrated, holistic method (Farinha et al., 2020:466). A holistic method includes declaring ESD a priority in policy and mandates, providing training to staff, promoting sustainability-related research, and collaborative work between stakeholders, faculties, and institutions (Farinha et al., 2020:466).

Absence of a holistic vision leads to the second challenge, namely poor transdisciplinary co-operation in HEIs, which leaves academics to work in isolation in their faculties and areas of specialisation (Avila et al., 2017:1271; Brodowski, 2017:842). Based on the Finish context, Takala and Korhonen-Yrjanheikki (2019:173) report that when sustainability was the responsibility of one individual or one faculty, it was not implemented effectively. Farinha et al. (2020:489) recommend that multidisciplinary approaches be utilised, as they are pivotal to the successful implementation of ESD.

Similarly, Lu and Zhang (2013:55) and Novo-Corti et al. (2018:819) describe interdisciplinary approaches as the foundation for ESD, since such approaches have the potential to reveal the complex relationship between society, the economy, and the environment. However, Thomas (2020:900) expressed his concern that the interdisciplinary nature and controversy associated with sustainability remain a challenge for HEIs. A further concern is that SD initiatives are occurring in isolation, and most initiatives involve campus environmental sustainability (saving electricity) instead of ESD (Da Silva et al., 2019:228; Takala & Korhonen-Yrjanheikki, 2019:173).

The third, and arguably the biggest, challenge hindering the effective implementation of ESD is the lack of support for sustainable initiatives from senior management of HEIs (Rampasso et al., 2020). Reporting about Portugal, Farinha et al. (2020:472) stated that top management of HEIs lack communication about sustainability-related strategies, opportunities and actions. Consequently, most sustainable innovations are limited to the campuses of HEIs lacking support from educational leaders (Avila et al., 2017). To that end, Mula et al. (2017:805) noted that sustainability-related initiatives in HEIs often rely on the attention and conviction of individual academics. Lu and Zhang (2013:56) recommend that management encourages enthusiastic and informed academic staff to continue to be the forerunners of the implementation of ESD. However, scholarly literature informs that it is important for academics globally to receive institutional support from top management to (a) tackle ESD-related challenges; (b) discuss and relay ESD-related ideas; (c) create a platform to rethink their own practices and strategies; and (d) influence ideas of others towards a wider change in HEIs (Lu & Zhang, 2013; Mula et al., 2017). Lu and Zhang (2013:53) noted that when there is a lack of

support from top management of HEIs, ESD is viewed as an optional addition to the curriculum and is at times implemented spontaneously by informed academic staff. As a result, these bottom-up sustainable initiatives are often unsuccessful (Avila et al., 2017:1270). UNESCO recommends the use of the top-down approach when implementing ESD, as it has proven to generate success (Farinha et al., 2020:490). Scholarly literature on Vietnamese HEIs has shown that when top management of HEIs neglect ESD-related planning and actions, communication, and efforts towards ESD amongst lecturers are diminished (Kieu et al., 2016:868). Mula et al. (2017:813) recommend that top management of HEIs receive ESD-related training.

The fourth challenge is grounded in the limited amount of multidisciplinary working groups, committees and offices allocated towards sustainability in HEIs which stems from a lack of guidance and support from top management (Avila et al., 2017:1271; Farinha et al., 2020:466). Having an individual (sustainability co-ordinator) and an office space to address concerns about sustainability provides decision-making power, hierarchical leadership, and guidance (Avila et al., 2017:1271). The lack of office space, sustainability co-ordinators and committees gives rise to the fifth challenge of poor record-keeping, reporting, assessing and accountability, which make it difficult for HEIs to track their in-house successes and shortcomings (Farinha et al., 2020:481).

The lack of sustainability-related leadership from top management of HEIs leads to the sixth challenge – specifically, poor implementation of sustainability-related commitments and policies (Brodowski, 2017:841; Farinha et al., 2020:486; Grindsted, 2011:29). Sustainability-related policy and declarations are important to move towards the goal of ESD (Farinha et al., 2020:486; Lu & Zhang, 2013:56; Lozano et al., 2013:2; Mula et al., 2017:818). In this regard, Brodowski (2017:841) and Lozano et al. (2013:2) noted that sustainability has been incorporated into the way resources are used, campuses are managed, and the commitment of HEIs has been shown through the signing of declarations and charters (Kyoto Declaration, and the Copernicus University Charter). However, the infusion of sustainability-related knowledge, skills, attitudes and values into research and teaching has not reached satisfactory progress (Brodowski, 2017:841). Farinha et al. (2020:486) and Grindsted (2011:29) highlighted that the signing of declarations and charters is an important driver for SD; however, it does not always lead to the implementation of commitments.

Poor implementation of ESD-related policies may negatively impact the curricula and research outputs of HEIs, which is the seventh challenge. As is evident, HEIs' curriculums do not fully include, and in some cases, totally disregards, information about sustainability (Avila et al., 2017:1270). Padayachee et al. (2018:290) underscore that there is an urgent need for the

curriculums of HEIs to be more receptive to changing economic and social realities. It is critical for HEIs to include sustainability-related skills, knowledge, attitudes and values in their curriculums and research (Farinha et al., 2020:467). In addition, ESD should not be taught once off but should receive adequate attention by being taught throughout the curriculum (Tierney et al., 2016:508). In short, a curriculum shift is necessary for the advancement of ESD at HEIs (Kieu et al., 2016:857). Lu and Zhang (2013:53) identified a concern that extends beyond the unreceptive curriculum of HEIs as a challenge, which is that Chinese HEIs and HEIs globally are not capitalising on the opportunity to improve the pedagogical competencies of educators.

The eighth challenge is grounded in the nature of research into sustainability, which tends to utilise similar methods of data collection and analysis, preventing ground-breaking innovation towards SD (Avila et al., 2017:1270). As is evident, HEIs in Portugal are experiencing a decrease in sustainability-related patents (Farinha et al., 2020:476). In addition, 50% of Portuguese HEIs are still in the beginning stages of implementing ESD, which sparked Farinha and Caeiro's (2018:913) concern that education and research on sustainability and inclusivity are still developing in HEIs in Europe. Farinha et al. (2020:467) recommend that HEIs advance sustainability-related research by including sustainability goals in their strategic planning, as this has proven to generate better research, academic compliance, and improved performance. In addition, HEIs should employ an interdisciplinary approach to research (Novo-Corti et al., 2018:55).

The ninth challenge is that academics and educators who contribute to ESD by infusing their research and teaching with innovative methods are not being commended for their efforts. Instead of being rewarded, managers of sustainable initiatives receive extra workloads and are expected to complete SD tasks in addition to their normal duties (Avila et al., 2017:1271). Farinha et al. (2020:490) reported lack of incentives as the main factor contributing to poor support from students and local collaboration for sustainability-related events and projects.

The last and one of the greatest challenges identified in the literature as hindering the effective implementation of ESD in HEIs is a lack of financial resources (Avila et al., 2017:1271; Farinha & Caeiro, 2018:933; Farinha et al., 2020:485; Fehlnert, 2019:26). Due to this, sustainable initiatives are developed with low funds and almost full reliance on the work of volunteers (Avila et al., 2017:1271). Lu and Zhang (2013:53) warned that lack of resources in HEIs will hinder change towards the implementation of ESD. Takala and Korhonen-Yrjanheikki (2019:173) reported that sustainable initiatives in Finnish HEIs were hampered by inadequate resources, especially in the field of engineering.

2.6 Opportunities for successful implementation of ESD

In addition to identifying and responding to challenges, HEIs can capitalise on opportunities towards the implementation of ESD. It is recommended that academics, educators and management of HEIs consider the following opportunities in order to effectively implement ESD in HEIs. Seven opportunities emerged from the reviewed international literature (Daniels & Niemczyk, 2021; Jodoin, 2020; Kieu et al., 2016; Lu & Zhang, 2013; Mulder et al., 2015; Novo-Corti et al., 2018; Thomas, 2020; Takala & Korhonen-Yrjanheikki, 2019):

- i. Motivate students and staff by utilising short-term goals, rewards and incentives.
- ii. Develop globally competent citizens.
- iii. Nurture the ability to think critically and solve real-life problems.
- iv. Adapt teaching methods, the curriculum and research to the dynamic nature of sustainability.
- v. Focus on changing the attitudes of learners instead of simply adding content to a course.
- vi. Experiment and find a flexible ESD implementation strategy that will work for the specific institution.
- vii. Prioritise ESD-related competencies in the professional development of staff and teacher training courses.

Mulder et al. (2015:385) noted that SD is a long-term goal; however, individuals striving to achieve sustainability should also have a short-term perspective and should focus on short-term rewards. Mulder et al. (2015:386) identified motivation as an essential tool HEIs can utilise to accomplish SD targets. The authors identified motivation as pivotal to the successful implementation of ESD. However, the two methods currently employed by HEIs to motivate students and lecturers are not always effective. Firstly, auditing tools may force educators to include ESD in their teaching; though, this is no motivator towards ESD. Secondly, showing people the magnitude of problems and presenting the fear that these problems may lead to global devastation is no motivator to change the behaviour and attitude of citizens (Mulder et al., 2015:387). Information about a serious problem does not trigger action. Similarly, too much information about problems associated with unsustainable actions can create disbelief, denial and further disregard for the importance of sustainability (Mulder et al., 2015:387). Simply put, motivating students and staff by speaking about a global catastrophe and overstating the magnitude of the problem may not lead to the desired outcome. Instead, as Mulder et al. (2015:388) propose, students and staff should be provided with options for action towards sustainability. In addition, the same authors called for attractive short-term opportunities for action to be included in activities that enable students to solve real-life problems in an interdisciplinary manner. When HEIs actively involve students in decision-making and ESD-

related activities, it would serve as a motivator and would encourage students to partake in the discourse on and action towards sustainability. However, Lu and Zhang (2013:58) noted that this may be problematic because many students work to pay tuition fees, have full schedules, and do not have the time or the energy to volunteer for extracurricular activities. The same authors provided a feasible solution, stating that students could be motivated to get involved in ESD-related activities if they receive incentives through extra credits or financial compensation.

According to Takala and Korhonen-Yrjanheikki (2019:172), the most important SD competencies required by graduates are methods to cope with uncertainty, complexity, and ambiguity. The aforesaid will require the acquisition of skills such as holistic thinking; critical, innovative, and reflective thinking; effective communication; and team-work skills (Jodoin, 2020:779; Takala & Korhonen-Yrjanheikki, 2019:172; Thomas, 2020:900; Zermeno & De la Garza, 2020:346). Similarly, it is imperative for graduates to have the capacity to predict future needs of citizens (Zermeno & De la Garza, 2020:346). In addition, it is essential for citizens to not only talk towards a common goal (sustainability) but also to learn to think together (Lu & Zhang, 2013:55). Critical thinking cannot be achieved by simply adding content to the curriculum (Takala & Korhonen-Yrjanheikki, 2019:172). Similarly, knowledge about sustainability alone is not enough to catalyse behavioural changes towards social, economic and environmental issues (Kieu et al., 2016:869). Kieu et al. (2016:870) raise their concern that HEIs are encouraging students to memorise sustainability-related content instead of developing sustainability-related competencies. These authors also note that educators need to change the attitudes of students instead of adding content to the curriculum.

Daniels and Niemczyk (2021) report that utilising teaching approaches that nurture globally competent citizens have the potential to develop graduates that can critically analyse the link between local and global sustainability-related issues. Similarly, Kieu et al. (2016:869) claim that for sustainability to be an achievable objective, education systems need to commit to nurturing global citizens. Furthermore, students who are globally competent will have the ability to solve real-life (local and global) challenges of the 21st century and to take informed daily decisions towards sustainability (PISA, 2018:7).

Changes within the social, economic and environmental realms of sustainability are dynamic and constantly subjected to change. Consequently, HEIs' curriculum, research and extension activities need to adapt to the dynamic nature of sustainability. One notable method of adapting is to utilise technology to expose students to current information through data, conferences, videos, and live chats with experts across the globe (Lu & Zhang, 2013:57; Novo-Corti et al., 2018:822). Furthermore, Takala and Korhonen-Yrjanheikki (2019:175) recommend that HEIs be flexible and not follow a strict, rigid strategy when implementing ESD. It is necessary that

strategies specify who is responsible for implementing a particular sustainability-related initiative. Additional advice to HEIs from Takala and Korhonen-Yrjanheikki (2019:175) is that students and staff be part of the discourse in developing strategies towards the implementation of ESD. It is proposed by the authors that strategic planning not only be grounded in environmental issues; social and economic stewardship must also be prioritised. Implementing SD takes time – thus, when implementing ESD, experimentation is necessary.

HEIs need to ensure their educators learn pedagogies that can enable ESD. Takala and Korhonen-Yrjanheikki (2019:175) recommend that SD be included in the criteria for public funding in research and education. Furthermore, it is imperative that HEIs enforce educational policy towards the implementation of ESD, transform teaching pedagogies, and train educators and researchers about the requirements of ESD. Takala and Korhonen-Yrjanheikki (2019) also deem it necessary for students to be educated by educators that are informed about multiple topics (economic, social and environmental) and can convey sustainability-related competencies to students.

2.6.1 Fostering sustainability-related competencies in teacher training and classroom practice

Developing countries such as South Africa and Brazil are vulnerable to social, economic and environmental challenges, which makes the implementation of ESD in teacher training programmes imperative for these countries (Brodowski, 2017:842; Kieu et al., 2016:855). Positive steps have been taken towards the implementation of ESD in HEIs; however, the size of the task is momentous and will require professional guidance and competency development for staff who educate and support learning (Mula et al., 2017:800; Mandikonza & Lotz-Sisitka, 2016:109). Kieu et al. (2016:853) and Thomas (2020:896) highlight that it is essential for educators to infuse their teaching with ESD. However, educators do not always have the ability to include ESD in their teaching and institutions for two reasons. Firstly, educators in training are not exposed to ESD (Brandt et al., 2019:632; Da Silva et al., 2019:228; Mula et al., 2017:802; Thomas, 2020:900). Secondly, employed educators do not receive sustainability-related training in the form of professional development. Consequently, the sustainability-related competencies of educators and educators in training are deficient, which negatively impacts their capacity to lead towards ESD (Mula et al., 2017:799). This is problematic because their students do not fully understand their responsibility and opportunities for action towards SD (Brodowski, 2017:845). As Kieu et al. (2016:865) pointed out, students from HEIs in Vietnam reported not knowing how to apply their sustainability-related skills and knowledge in their future teaching careers.

According to Lu and Zhang (2013), Mula et al. (2017) and Thomas (2020), not enough attention is paid to the development of students' sustainability-related competencies in HEIs for three reasons. Firstly, the main focus in HEIs has been on research excellence (Mula et al., 2017:804). Secondly, both educators and students are not accustomed to transformative teaching methods and feel comfortable with traditional approaches (Lu & Zhang, 2013:54; Thomas, 2020:900). Thirdly, educators are not always comfortable with relinquishing their positions of power in the classroom in order to facilitate learner-centred learning.

Brandt et al. (2019:631) and Mula et al. (2017:805) urged HEIs to prioritise sustainability-related competencies in teacher training programmes, as the successful implementation of ESD in HEIs is greatly dependant on the commitment and competencies of educators in the institution. The focus of ESD is on the transformation of pedagogical approaches and competencies (Mula et al., 2017:805), as traditional pedagogical practices are not adequate to address the complexity of SD (Mandikonza & Lotz-Sisitka, 2016:109; Thomas, 2020:896). Furthermore, Brandt et al. (2019:631) emphasise that it is critical for ESD to be prioritised (through policy and practice), not only in teacher training programmes but also during employment in the form of professional development. According to Mula et al. (2017:814), effective professional development entails arming educators with the ability to not only include sustainable elements in the existing system but also to influence sustainability-related changes in the institution. It is promising that through research and international discourse, new strategies and resources are being developed to assist educators in implementing ESD in teaching, the curriculum and their institutions (Mula et al., 2017:805). However, this is a new trend, and little is known about the utilisation and effectiveness of these strategies and resources (Mula et al., 2017:805).

Specifically focusing on pedagogical change, Mula et al. (2017:799) recommend that it (pedagogical change) occurs at three levels. The first level is in the classroom, where new, transformative classroom practices should be implemented. The second level is grounded in the curriculum of teacher training programmes, which should be redesigned. To that end, Mandikonza and Lotz-Sisitka (2016:110) and Thomas (2020:896) advised educators to embrace and be a part of the change by taking responsibility for becoming the architects of the curriculum instead of the distributors of the curriculum developed by others. The last level refers to the strategic planning of educational leaders, who should ensure that educational priorities of HEIs at all levels are geared towards sustainability (Mula et al., 2017:799). Furthermore, it is the responsibility of educators to reflect and rethink their own educational teaching approaches and to catalyse change at an academic, departmental and institutional level (Mula et al., 2017:804). The same authors reported that catalysing change at different levels of HEIs will require educators to possess knowledge and understanding of four topics. Number one is educators'

familiarity with the transformation of assessment. The second topic refers to educators' profound understanding of the best methods to catalyse educational change. Number three calls for educators' awareness of how new pedagogies can be applied in different disciplines. The fourth topic requires educators' mindfulness of the nature of sustainable practices in different professions.

It is also important to note that professional learning will take time, resources, support and incentives (Mula et al., 2017). Staff development should be continuous, allow educators to connect with sustainable thinking and develop competencies that can catalyse change in the classroom and the institution (Mula et al., 2017:804). The above-mentioned can be achieved by providing opportunities for mentoring, collaboration and shared pedagogical inquiry. It is important for teacher training programmes to train educators to incorporate transformative learning methods into their teaching (Mula et al., 2017:800). Lu and Zhang (2013:54) note that learning can be described as transformative when learning occurs holistically, explores realities and interrelations between them, enables critical thinking, and when learners are actively involved (through questions, debate and critique) in the learning process. Similarly, transformative learning can occur by creating opportunities to learn from real-life environments with real-world problems (Brandt et al., 2019:632) which should initially be grounded in the local environment of educators and subsequently be expanded to the global environment (Thomas, 2020:896; Zermeno & De la Garza, 2020:347).

2.6.2 The key to sustainability: Classroom practices

Jodoin (2020:779) expresses his concern that teaching approaches with the potential to develop sustainability-related competencies are not being utilised in the classroom because they conflict with traditional teaching approaches. The same author claims that active learning, participatory learning and interdisciplinary thinking are competencies students need to develop. Furthermore, Brodowski (2017:843) and Jodoin (2020:780) recommend that educators utilise two methods to nurture the above-mentioned sustainability-related competencies within their classrooms. Firstly, learner-centred approaches should be utilised in each lesson. Similarly, learner-centred approaches should be infused with real-life, sustainability-related critical thinking and problem-solving. Zermeno and De la Garza (2020:345) recommend that ESD incorporates participatory (learner-centred) teaching and learning methods that encourage a culture of sustainability. Secondly, it is imperative for educators to have knowledge about sustainability and the capacity to transfer sustainability-related knowledge in a meaningful way.

In addition, Thomas (2020:896) makes three recommendations that educators can consider when nurturing sustainability-related competencies. Firstly, Thomas argues that classroom

learning about sustainability is essential to develop ethics and a sense of responsibility amongst learners. Secondly, learning, according to him, cannot be limited to the classroom; outdoor learning experiences are as valuable and can be interlinked with opportunities to improve environmental, social and economic conditions of society. However, it is important to note that curriculums in education systems globally may not prioritise opportunities for learning to occur outdoors (Thomas, 2020:897), thus educators should create opportunities for outdoor learning. Outdoor learning – which Thomas (2020:898) calls place-based education – creates a link between the classroom and the local environment in a multidisciplinary nature. Through the analysis of their local environment, students could develop a better understanding of society along with their responsibility and opportunities for SD (Thomas, 2020:900). Exposing students to the outdoors increases the potential of HEIs nurturing sustainability-literate graduates (Thomas, 2020:900). It is also important to note that the implementation of place-based education does not receive adequate attention in teacher training programmes (Thomas, 2020:900). Thirdly, Thomas (2020:899) recommends that educators strive to develop a comparative perspective when teaching towards ESD. Exposing students to local and global environments would allow them to develop a better understanding of their local environment and the role they play in the global ecosystem (Thomas, 2020:899; Zermeno & De la Garza, 2020:347).

2.7 Summary

Countries globally are facing unprecedented challenges and as a response have committed to the UN 2030 Agenda for Sustainable Development. More specifically, HEIs have shown considerable commitment and progress towards the UN 2030 Agenda for Sustainable Development and ESD through international dialogue, technology, conferences, teaching and learning, research, strategic planning, and signing of declarations (Farinha et al., 2020:467; Mula et al., 2017:799). However, the reality in many developing countries, such as South Africa and Brazil, is that ESD is only starting to gain academic momentum (Solera & Laya, 2017:279). South African and Brazilian HEIs and HEIs globally grapple with challenges such as a lack of support from top management as well as a lack of financial resources (especially in developing countries) towards sustainable initiatives (Avila et al., 2017:1271; Farinha & Caeiro, 2018:933; Farinha et al., 2020:485; Fehlnert, 2019:26; Rampasso et al., 2020). As is evident in the reviewed literature, HEIs can respond to these challenges by prioritising the development of globally competent citizens, which has the potential to cultivate critical thinking and the capacity to solve real-life problems. Developing sustainability-related competencies of educators, educational leaders and students through professional development and teacher training

courses holds high potential to effectively respond to several challenges and to shift the world onto a sustainable path.

CHAPTER 3: RESEARCH DESIGN AND METHODOLOGY

3.1 Introduction

This chapter provides details regarding the research design and methodology that were employed in this study. The following sections describe methods and procedures that were employed to collect and analyse data. In addition, the theoretical framework, trustworthiness of the study as well as ethical considerations are discussed.

3.2 Research design

According to Tie et al. (2019:1), a research design is a systematic plan utilised by researchers to answer the research questions of a particular study. In addition, the research design serves as a plan consisting of steps and strategies that researchers consider before undertaking research (Tabe, 2015). A qualitative research approach was adopted in this study. According to Leedy and Ormrod (2019), a qualitative approach is utilised to attain an understanding about the complexity of a phenomenon. Additionally, qualitative research may aim to understand a phenomenon from the participants' perspective or may be used to evaluate the effectiveness of policies, practices, and innovations (Leedy & Ormrod, 2019).

Moreover, a qualitative document analysis approach was followed in this study to evaluate the effectiveness of South African and Brazilian HEIs in implementing ESD. A qualitative research method was the best method for the purpose of this study for three reasons (Daniel, 2016:93). Firstly, qualitative research provides detailed descriptions about real-life situations – thus, detailed descriptions were provided regarding the effectiveness of South African and Brazilian HEIs in implementing ESD. Secondly, qualitative data are unique, as such data consider human behaviour in a social context and a variety of phenomena to generate understanding. Lastly, qualitative data collection and analysis allow the researcher to generate theory, which this research study aimed to do following the grounded theory framework. Daniel (2016:94) also noted that qualitative research methods have limitations. The findings of qualitative research are limited to a certain group and cannot be generalised to groups that were not part of the investigation.

As this was a comparative study, the researcher employed a qualitative comparative method which adhered to three recommendations that researchers should consider when employing a comparative method (Esser & Vliegthart, 2017:1; Mugo & Wolhuter, 2013:3; Piovani & Krawczyk, 2017:823). Firstly, equivalence was ensured when the researcher collected data that

were comparable between different contexts (Esser & Vliegenthart, 2017:1). The state of one or more object (country or institution) was compared utilising at least one common property (i.e., contextual condition) (Piovani & Krawczyk, 2017:823). In addition, biases were avoided when the documents were purposefully sampled (Esser & Vliegenthart, 2017:1). Secondly, comparative research differs from non-comparative studies in that such research attempts to clarify the differences and similarities between the objects under investigation and relationships between the objects, taking into consideration their contextual conditions (Esser & Vliegenthart, 2017:2). According to Mugo and Wolhuter (2013:3), knowing that differences exist between education systems is not enough; researchers should examine contextual conditions of countries and uncover why differences exist, which was done in this study. This study explored the differences and similarities in the implementation of ESD in South African and Brazilian HEIs against the backdrop of the contextual conditions in the two countries. Lastly, the comparison, data collection and analysis techniques and conceptualisations were grounded in a common theoretical framework.

3.3 Research paradigm

Perera (2018) defined a research paradigm as a set of mutual beliefs shared by scientists about how research problems should be understood and what approaches should be taken to address the problem. Furthermore, researchers reflect on their philosophical views and analyses of the world before conducting a research study (Tie et al., 2019:1). This was an exploratory qualitative study with a postmodern research perspective. Nieuwenhuis (2020) notes that most qualitative studies are exploratory in nature and aim to attain a better understanding of a topic, group, process, or setting. In the case of this study, *topic* referred to ESD; *group* to South African and Brazilian citizens; and *setting* to higher education. Nieuwenhuis (2020:61) further contends that exploratory research does not start with a fixed theoretical framework but rather tries to identify an emerging theoretical framework when analysing data. Therefore, a researcher who adopts this philosophical paradigm does not have a single perspective but believes that multiple realities exist (Forghani et al., 2015; Hossienia & Khalili, 2011). There is, nonetheless, an emphasis on diversity, innovation, change and challenging conventional methods (Hossienia & Khalili, 2011; Nieuwenhuis 2020). The aforementioned authors also explained that the objective of a postmodern paradigm is not to find conclusive realities and facts but to examine and explain a specific setting and how it applies to a certain group of people in a certain situation at a certain time. In the context of this study, the objective was to find out how effectively South African and Brazilian (specific settings) HEIs (specific group of people) implement ESD. Postmodern researchers value the voice of the insider and consider the actions, statements, and perspectives of those on the inside of the topic being investigated

(Nieuwenhuis, 2020). This study aimed to explore the effectiveness of South African and Brazilian HEIs' implementation of ESD. The analysis of the relevant documents on this topic provided an inside perspective and knowledge.

3.4 Methodology

In this qualitative study, document analysis was employed. Bowen (2009) describes document analysis as a methodical process that entails reviewing, examining, and evaluating documents to gain understanding and meaning. Furthermore, document analysis is used to supplement other research methods but can also be effective as an individual research method. Similarly, Merriam and Grenier (2019) state that a range of documents, literature and reports can be utilised in a grounded theory study.

Document analysis was the best method to collect data for this study for two reasons. Firstly, the limitations of gathering data in person due to Covid-19 were considered, and therefore an informed decision was made to employ document analysis as a method. The second reason is grounded in the concern that research exploring sustainability tends to utilise similar methods of data collection and analysis, which prevents ground-breaking innovation towards SD (Avila et al., 2017:1270). To this end, document analysis was employed because the literature review phase of this study revealed that there is a scarcity of research employing this method when investigating ESD.

The following are advantages and limitations of document analysis (Bowen, 2009; Cardoso et al., 2017; Medlock, 2015). Firstly, document analysis is efficient, as it is less time consuming and more efficient than other research methods such as interviews and surveys. Secondly, data are readily available on the Internet and do not always require the authors' permission to be used. Thirdly, document analysis is cost-effective as the data contained in documents have already been collected. Documents are stable and remain unaffected and unaltered by the research process. Lastly, documents can be revisited and reviewed repeatedly. However, Bowen (2009) and Medlock (2015) also warn about the potential disadvantages of document analysis. For instance, documents may include inadequate details because the documents were not created for research purposes. Access to certain documents may be restricted, and some of the information in documents may not be relevant anymore. There is also a risk that the selection and interpretation of documents are biased. Nevertheless, these imperfections should not be seen as major disadvantages, as they can be addressed.

3.5 Theoretical framework

This study did not start with a specific theory in mind. However, following the principles of the grounded theory approach, an attempt was made to identify an emergent theory grounded in data (Nieuwenhuis, 2020; Strauss & Corbin, 1990). According to Nieuwenhuis (2020), in a qualitative study, one does not begin with theory to test and verify. Instead, consistent with the inductive model of thinking, a theory may emerge during the data collection and analysis phase. It may also be used relatively late in the research process as a basis for comparison with other theories. As is evident in the scholarly literature, in qualitative research, theoretical frameworks may emerge when analysing data in order to reduce biased views the researcher may have when stating the research findings (Grant & Osanloo, 2014). To that end, this qualitative document analysis study followed the principles of grounded theory (Strauss & Corbin, 1990). According to Noble and Mitchell (2016) and Tie et al. (2019), grounded theory involves theory development based on data that have been thoroughly selected and analysed methodically. Bowen (2009) explains that most grounded theory studies involve interviews and observations; however, a study that only employs the use of documents can also be driven by grounded theory as a theoretical framework. Bowen also notes that grounded theory is discovered, developed and subsequently confirmed through the organised collection and analysis of data. For this study, the researcher followed systematic procedures during the data collection and analysis phase, which relied on the creation of open codes, axial codes, and selective codes (Creswell, 2009). Furthermore, in grounded theory research, the researcher is the main instrument of data collection and analysis. The researcher depends on expertise and instinct and uses an interpretive perspective to peruse data (Bowen, 2009:36).

3.6 Data collection

Data collection refers to the methods researchers use to collect information so as to meet the objectives of their study. During the process of data collection, boundaries are set for the study, and steps to collect and record information are outlined (Creswell, 2009). The following subsections thoroughly describe the document-collection process.

3.6.1 Sampling method

Amonashvili (2011) and Foley (2018) identify two types of sampling methods that can be used in document analysis. The first method involves selecting a compilation of relevant documents and then randomly selecting a desired number for analysis (probability). The second method, known as purposive sampling (non-probability or subjective sampling), relies on purposefully selecting documents for analysis. Creswell (2013) recommends the use of purposive sampling

methods when conducting a qualitative study, as they allow researchers to uncover accurate answers to their research questions and ultimately attain a better understanding of the phenomenon under investigation. Adhering to the recommendation made by Creswell (2009), a purposeful sampling method was employed in this study because of the possibility that a random selection of documents may yield inconclusive and inconsistent results. In addition, the purposive sampling method used allowed the researcher to use prior knowledge to select documents that fit a particular profile (e.g., higher education and ESD). A purposeful selection increases the potential of achieving data and theoretical saturation – thus, purposeful sampling was the best sampling strategy for this study (Suri, 2011). Furthermore, three recommendations made by Suri (2011:73) were followed in the selection of the sample size: firstly, there had to be adequate data to make comparisons between themes; secondly, the sample size had to consist of multiple perspectives; lastly, the sample size had to contain enough information to achieve the purpose of the research.

The following steps were taken during purposive sampling (Nieuwenhuis, 2020):

- a) the sample was selected in line with the main research question and subquestions;
- b) the sample produced relevant, rich information on the phenomenon under investigation;
- c) the sample was credible in terms of explanation and descriptions.

3.6.2 Purposeful selection of documents

In order to undertake document analysis, applicable data must be accessible (Yavuz, 2016). The rationality and power of purposeful sampling are embedded in selecting information-rich cases (documents) that contribute to the purpose of the study, hence the term purposive sampling (Harsh, 2011). Furthermore, information-rich documents yield in-depth understanding and observations, as opposed to generalisations. In this study, 40 information-rich documents (between 2015–2021) were purposively selected from HEIs in South Africa and Brazil and were listed alphabetically (see Appendix A). Subsequently, the 40 documents were assigned identifiers according to the country (e.g., SA1 to 5-DOC-1 to 20, or BR 1 to 8-DOC-1-20). The aforementioned naming system was necessary, as one of the ethical criteria for this study (see Appendix B) was that the HEIs under investigation remain anonymous. In addition to the 40 documents attained from the official website of the HEIs under investigation, 20 journal articles were collected and assigned a document name (JA-DOC-1-20). The research findings are presented in chapter 4, and the aforementioned naming system is used.

The identifiers or naming system was also used to refer to a specific or a combination of the 60 documents selected for the purpose of this study. It is important to note that certain documents (SA1-DOC-1; SA2-DOC-1; SA1-DOC-4; SA2-DOC-2; SA5-DOC-1) were written prior to the year

2015; however, the documents remained relevant and contributed to the research findings, as these strategic documents were the latest long-term planning documents published by HEIs. Additionally, the aforementioned documents revealed the aims of the HEIs over a number of years (Vision 2010–2025), thus making these documents relevant.

Documents were purposively selected according to their relevance and authenticity. In order to make the process manageable, documents were selected from the top ranked universities for three reasons. Firstly, top ranked institutions are expected (as required by some global ranking criteria) to be well vested in sustainability. Secondly, the researcher noted that highly ranked universities had documents that contained details about their sustainability aspirations readily available. However, in cases where the documents from lower ranked institutions revealed that they were well vested in sustainability, they were included in the study. In the case of Brazil, lower ranked HEIs were well vested in sustainability and had free, readily available documents online revealing their commitment to sustainability, thus they were included in the study. In the context of South Africa, lower ranked HEIs were included as journal articles revealed many sterling examples of the implementation of ESD in lower ranked HEIs. Lastly, selecting documents from highly ranked universities in the two countries under investigation ensured that there was uniformity when collecting data from the two different contexts under study. Journal articles discussing ESD in South Africa and Brazil were collected to ensure inclusion of multiple perspectives in the study. All documents were freely available on the Internet and on the universities' respective official websites. The universities were selected according to the QS (Quacquarelli Symonds) BRICS (Brazil, Russia, India, China, and South Africa) University Rankings 2019. The QS BRICS ranking was established in 2013 with the aim of highlighting prominent universities in the five major evolving economies of the BRICS countries (i.e., Brazil, Russia, India, China, and South Africa). Furthermore, the QS BRICS ranking system was used for this study because QS specialises in the analysis of HEIs and is trusted globally (Lumpur, 2019). Additionally, the QS stars ranking system uses the social contribution universities make as criterion when ranking universities (Top Universities, 2014).

In order to obtain relevant documents that would achieve the aim of this study, the researcher ran keyword searches in line with the four research objectives of this study. The first keyword searches aimed to attain documents that would reveal the emphasis dedicated to SD in the mission and vision statements as well as in other strategic planning documents published by HEIs. For this reason, searches involved keywords such as mission and vision statement (*declaração de missão e visão*); institutional development plan (*plano de desenvolvimento institucional*); and strategic framework (*quadro estratégico*). It is important to note that when visiting Brazilian HEIs' official websites, relevant documents were not always available in

English. Consequently, all keyword searches were conducted in Portuguese, as this is the official language of Brazilian HEIs. Google Translate (2021) was utilised to translate all English keywords to Portuguese, which yielded greater success in attaining documents. In addition, documents such as strategic frameworks and institutional development plans collected from some Brazilian HEIs were written in Portuguese, with no English versions available. Thus, for the purpose of successful data analysis, the researcher made use of a reliable website termed *Online Document Translator* (2021) to convert Portuguese documents to English. It is important to note that all the pages of all the documents selected for this study were successfully translated from Portuguese to English. However, the limited amount of text that appeared in images was not successfully translated.

The second keyword searches aimed to attain documents that provided insight into the alignment of the curriculum, research practices and learning practices at HEIs with the principles of SD. Keyword searches in the second phase included words such as research report (*relatório de pesquisa*); teaching and learning (*ensinando e aprendendo*); and course outline (*esboço de Curso*). The documents collected during the first two phases of keyword searches provided detailed descriptions about the third research objective, which was to describe the implementation of sustainable practices and SD in extension activities in HEIs.

The third phase of keyword searches aimed to include diverse perspectives on the implementation of ESD in South African and Brazilian HEIs. Relevant complementary documents (journal articles) were obtained by searching for keywords (education for sustainable development [ESD]) in reliable scholarly databases. A total of 20 journal articles were purposively sampled in this research study. In order to diversify the findings of research questions 1, 2 and 3, 11 journal articles exploring the mission and vision statements, research, curriculum and extension activities of Brazilian and South African HEIs were collected. More specifically, three journal articles reported on Brazilian and South African HEIs collectively. Meanwhile, five journal articles reported on Brazilian HEIs and three articles reported on South African HEIs. The collection of the aforementioned journal articles also revealed how Brazilian and South African HEIs could maximize the implementation of ESD, which is the fourth research objective. In alignment with the fourth research objective, nine journal articles were collected that explored ways Brazilian, South African and HEIs globally could maximize the implementation of ESD.

Data analysis was conducted after carefully reviewing and reflecting on relevant documents. Subsequently, a decision was made whether the document was relevant for the purpose of the study (see table 3.1). The following criteria and steps were considered (Nieuwenhuis, 2020; Triad, 2016) to ensure selection of relevant documents:

- a) all possible documents to be examined were listed;
- b) the publication date of the documents was considered;
- c) documents based on first-hand observations were given priority;
- d) biases in the documents were identified and addressed by using multiple sources and considering different explanations;
- e) the purpose of each document was assessed;
- f) the main ideas and perspectives in each document were identified.

The following table is an excerpt of the record kept throughout the selection of the relevant documents. Eventually, the record allowed for validations of which documents should be considered relevant for this study. As required by the ethical clearance, to maintain the anonymity of the institutions, each document was assigned a particular identifier. As explained earlier (§ 3.6.2), the identifiers assigned symbolic meaning to descriptions and interpretations provided in this study.

Table 3.1: Excerpt of record-keeping, validating document selection

Code of a document	Reason for selecting document for analysis	Interpretations/notes after analysing the document
SA4-DOC-1	This document was selected for analysis on 20 June because it is the latest strategic planning the HEI has released. Additionally, it contains details about the mission and vision statement (RQ1) and core strategic themes. This document refers to the annual institutional plan which discusses success and amended plans. To this end, the next document to be collected for SU should be the annual institutional plan.	The HEI aims to utilise its resources to respond to the needs of society. The document also contains good references and arguments pertaining to HEIs responding to 21st-century trends, listing sustainability as one of the 21st-century trends. All documents analysed thus far aimed to improve social conditions within society and achieve social justice. It is concerning that this HEI uses its mission to set out what it strives to achieve, yet sustainability is not mentioned. Does this mean that the HEI does not strive to achieve sustainability? The HEIs aims to collaborate with various stakeholders, utilise interdisciplinary approaches and research to improve conditions within society; however, SD is not directly linked to this. Extension activities and sustainable practices are not mentioned.
BR5-DOC-2	This document was selected on 6 July because it contains detailed descriptions about the HEIs curriculum (RQ2), extension (RQ3) and other sustainable practices at the HEI.	The HEI makes attempts to respond to societal challenges and contribute to achieving social justice; however, there is an emphasis on environmental sustainability and environmental practices instead of on ESD. The HEI does not approach sustainability in a holistic manner.

JA-DOC-8 (Some of the challenges in implementing ESD: perspectives from Brazilian HEI students)	This document was selected on 4 October 2021 because it contains information useful to answering RQ 2 and 4.	The article reveals that Brazilian HEIs are struggling to incorporate sustainability-related content into the curriculum. In addition, Brazilian HEIs focus on environmental sustainability and do not fully include the other dimensions of sustainability. The same findings were made when analysing documents from Brazilian HEIs. The authors did extensive research to uncover challenges Brazilian HEIs face when implementing sustainability. Consequently, new challenges, opportunities, codes, and information emerged that were useful for the findings.
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3.7 Data saturation

According to Nieuwenhuis (2020), a qualitative study that follows the principles of a grounded theory approach, should consider three interconnected factors during the research design phase. Firstly, theoretical saturation should be administered when considering the data sources and the sample size. In this study, theoretical saturation was achieved by thoroughly investigating all the characteristics of categories and relationships between categories to develop theory (Braun & Clarke, 2019:2). More specifically, theoretical saturation was achieved by identifying and including all of the focal variations of the concept (ESD) in the development of an emerging theory. According to Aldiabat and Le Navenec (2018), theoretical saturation is in line with grounded theory. Secondly, data saturation is conceptualised as the point where all themes and categories have been investigated to such an extent that no new information, data, perspectives, and themes are forthcoming (Braun & Clarke, 2019:2; Harsh, 2011; Nieuwenhuis, 2020; Saunders et al., 2017). Data saturation was critical for this study, as it (data saturation) contributes to the trustworthiness of the research (Braun & Clarke, 2019:2). In the case of this study, the researcher aimed to achieve data saturation for each research question (see table 3.2), which ensured that the status of data saturation could be monitored, was manageable and precise. It was clear to the researcher that data saturation was achieved when no new information (perspectives, insights and themes and categories) was forthcoming when collecting and analysing documents (Harsh, 2011). Lastly, theoretical sampling was used and described as purposive sampling that involves an iterative process that requires the researcher to sample the data sources (documents) in an attempt to promote, assess and develop theory (Nieuwenhuis, 2020). Theoretical sampling is a process that identifies what is not known (gaps) so that further data collection (purposive sampling) can occur. For this research study, the aforementioned process was repeated until theoretical saturation occurred (Sbaraini et al., 2011). For the aforementioned iterative process to be implemented effectively, it was important for the collection and analysis of data to occur simultaneously in different stages. Harsh (2011) alluded to the possibility of assessing the status of data saturation at various stages of a

research study. Consequently, with data saturation and theoretical sampling in mind, data collection and analysis for this study occurred simultaneously in six stages.

After each stage of data collection, the researcher identified gaps and addressed them (gaps) in the next stage of data collection and analysis. All decisions taken, such as reasons for selecting documents and strategies to address research gaps during each phase, were noted in a research journal. The first stage entailed the collection of institutional development plans, strategic frameworks, and mission and vision statements. The second stage involved documents containing details about the HEIs' long-term research strategy and detailed research reports. The third stage involved the collection of strategic teaching plans and learning reports. After the third stage of data collection and analysis, the researcher noted that data saturation could not be claimed for the second research question, as this research question explored three interrelated components, namely curriculum, research, and learning practices. Consequently, it was imperative that more documents be collected. The fourth stage consisted of the collection of both teaching and learning strategies and research reports. Collecting and analysing more than 40 documents (written by the HEIs under investigation) responding to research questions one, two and three were redundant, as the documents started to reveal similar information and codes. Consequently, the fifth stage of data collection and analysis involved the collection of 10 journal articles exploring ESD in South Africa and Brazil. The collection and analysis of the 10 journal articles provided responses to research questions one, two and three from the perspectives of prominent scholars in the field of HESD. The last stage entailed the collection and analysis of 10 journal articles investigating ESD-related challenges and methods of best practice that HEIs can employ to maximise the implementation of ESD, which answered research question four. The collection and analysis of the additional journal articles assured theoretical and data saturation for this study, since no new codes were forthcoming during the open coding process and collecting further data would be redundant (Braun & Clarke, 2019:2).

The following table provides an excerpt from the record-keeping regarding data saturation for each research question. The last column showcases the codes in specific documents that informed a particular research question.

Table 3.2: Excerpt from record-keeping for data saturation for each research question

Research question	Reoccurring information	Code of the document
i. How much emphasis is dedicated to sustainable development in the mission and vision statements as	Some South African and Brazilian HEIs do not include sustainability in their mission and vision statements.	SA3-DOC-1; BR1-DOC-1; BR4-DOC-1; SA4-DOC-1; SA2-DOC-2; BR4-DOC-2; BR2-DOC-4

well as in other strategic planning documents of higher educational institutions?	Other SA and BR HEIs mention sustainability in mission and vision.	BR2-DOC-2; BR7-DOC-1; BR5-DOC-4; BR6-DOC-1; BR6-DOC-2; BR8-DOC-1
	It is, however, clear that sustainability is utilised vaguely and is defined by only one HEI (SA1-DOC-1). The role of staff and students in the attainment of sustainability is not clearly articulated.	
ii. How the curriculum, research and learning practices at higher educational institutions align with the principles of sustainable development?	Curriculum: the curriculum of SA HEIs pays very little attention to sustainability-related content. BR HEIs do not mention sustainability in their curriculum much.	SA3-DOC-3; SA4-DOC-3; SA2-DOC-3; SA1-DOC-3; SA1-DOC-4; JA-DOC-8; JA-DOC-10
	Research: SA research is heavily aligned with the SDGs and sustainability. BR research does not include sustainability to the extent of South African HEIs. BR can learn from SA HEIs' commitment to SDGs and improve the conditions within society. Sustainability-related research has many rewards for HEIs, such as increased funding and a higher global ranking.	BR2-DOC-1; SA1-DOC-2; SA3-DOC-2; BR2-DOC-3; BR7-DOC-2; SA3-DOC-4; SA2-DOC-4; SA4-DOC-4 JA-DOC-7; JA-DOC-12; JA-DOC-14; JA-DOC-20
	Interdisciplinary approaches and strategies to research, extension activities and learning is implemented; however, they are not always linked to sustainability. However, one can conclude that if research, extension and learning linked to sustainability occur, it will occur in an interdisciplinary fashion. The word <i>interdisciplinary</i> is mentioned on multiple occasions and is clearly a priority to HEIs.	BR4-DOC-1; BR5-DOC-1; SA1-DOC-2; SA4-DOC-2; BR5-DOC-4; BR2-DOC-4; BR7-DOC-1; SA1-DOC-4; SA3-DOC-4
iii. How do higher educational institutions implement sustainable practices and extension activities in education?	Through SD in extension activities, HEIs are utilising their resources, staff and students to benefit the communities that host them. BR HEIs have a strategic approach which aligns the curriculum, research and extension activities. In addition, BR students receive extra credits and scholarships for partaking in extension activities.	BR5-DOC-1; BR3-DOC-2; BR2-DOC-2; BR4-DOC-2; BR5-DOC-4; BR8-DOC-3

iv. How can South African and Brazilian higher educational institutions maximise the implementation of education for sustainable development?	Many challenges exist when implementing ESD; however, there are many viable solutions. There are two methods to maximise ESD that are repeatedly mentioned. The first is a whole-institution approach that declares ESD a priority. Equipping educators with ESD-related competencies is essential in the quest to equip citizens with sustainability-related values, skills and competencies.	JA-DOC-10; JA-DOC-11; JA-DOC-12; JA-DOC-13; JA-DOC-14; JA-DOC-15; JA-DOC-16; JA-DOC-17; JA-DOC-18
Other forthcoming themes that may be useful during axial coding and the emerging theory.	HEIs are focused on environmental practices and content instead of ESD.	SA5-DOC-1; BR1-DOC-1; SA2-DOC-1; SA1-DOC-1; SA2-DOC-2; BR5-DOC-2; SA4-DOC-2; BR7-DOC-1; BR7-DOC-2; BR6-DOC-1; SA3-DOC-4; BR8-DOC-1; SA2-DOC-4; BR8-DOC-2 ; BR8-DOC-3; JA-DOC-5; JA-DOC-6; JA-DOC-9
	Although environmental sustainability receives special attention, so too does topics such as social justice and equity. It is important to note that although the environmental and social realms of sustainability are addressed adequately by HEIs, they are not addressed in an interconnected, interdisciplinary manner. These two realms of sustainability are discussed in isolation.	SA4-DOC-1; BR4-DOC-1; SA2-DOC-1; BR5-DOC-2; SA4-DOC-2; SA3-DOC-3; BR7-DOC-1; SA2-DOC-3; SA5-DOC-4; JA-DOC-1; JA-DOC-2; JA-DOC-8; JA-DOC-9

3.8 Trustworthiness

Scholarly writings (e.g., Devault, 2019; Gunawan, 2015; Nieuwenhuis, 2020) identified four aspects of a qualitative study that are meant to ensure trustworthiness, namely credibility, transferability, dependability, and confirmability. Credibility is the extent to which the research findings are truthful and believable, while transferability denotes how the research is relevant in other contexts (Korstjiens & Moser, 2018). If another researcher analyses the raw data, and the same findings are uncovered, then the research can be deemed dependable (Korstjiens & Moser, 2018). Gunawan (2015) stated that dependability is not always achievable or necessary in qualitative studies because their reality and knowledge is multiple. Other researchers may not arrive at the same or similar conclusion as the original researcher when analysing raw data.

Therefore, dependability was not used in this study to ensure trustworthiness of the research. Confirmability refers to the extent to which the researcher has interpreted the research findings in a neutral, unbiased manner from the raw data (Devault, 2019). Gunawan (2015) declared a research study as trustworthy and credible only if the reader of the report deems it to be trustworthy. Therefore, all decisions and actions taken when collecting and analysing data in this study were made transparent and were thoroughly described.

As advised by Devault (2019) and Nieuwenhuis (2020), the following steps were undertaken to ensure the credibility, transferability, and confirmability in this study: (a) credibility of the findings was assured through the use of a transparent, sound research design and data analysis methods. The collection and analysis of the research data matched the research questions, objectives and theoretical framework of this study, which also contributed to the credibility of the findings; (b) transferability of the research was made evident by relating it to different contexts, and the documents that were used were related to the phenomenon (ESD) and the context (South African and Brazilian HEIs). This was achieved through purposive sampling as described earlier. The research was specific, provided rich, detailed descriptions, and avoided generalisation; (c) confirmability was established by the research trail (journal) as described in § 1.13.

In conjunction with the aforesaid, the trustworthiness of this qualitative study was also ensured by the following strategies (Braun & Clarke, 2019:2; Korstjens & Moser, 2018; Noble & Smith, 2015):

- a) personal biases which clouded findings were accounted for;
- b) the research was transparent and showed a clear decision trail and thorough record-keeping (see figure 4.1–4.3 and table 3.1–3.2);
- c) multiple perspectives (different types of documents) were incorporated into the research;
- d) thought processes and interpretations when analysing data were justified and explained;
- e) other researchers (supervisors) were consulted to reduce the risk of biased interpretations;
- f) theoretical and data saturation were achieved.

3.9 Ethical considerations

In this study, freely available public documents from tertiary education institutions as well as journal articles were accessed and used as data sources. Tripathy (2013) recommends that data must be relevant, as the original data were not collected with the intent to answer the current research question and to achieve the current research purpose. The data were evaluated thoroughly and selected based on the criteria stated in § 4.2. According to Tripathy

(2013), there are no major ethical issues when conducting document analysis. If documents are publicly available on the Internet, in a book or on other public platforms, permission for use and further analysis is allowed as long as the source and authors are acknowledged. In addition, ethical clearance was obtained from the Research Ethics Committee of the NWU (ethics number: NWU-01276-20-A2). As per the ethical clearance (Appendix B) received, the names of the institutions under investigation were kept confidential. To that end, the names of the analysed documents were assigned symbolic identifiers (§ 3.6.2), and the actual titles were not disclosed.

3.10 Contribution of the study

As explained in section 1.16, this study was designed to make a contribution to the field of Comparative and International Education by informing HEIs which areas of their institution (vision and mission statements; research; teaching; curricula; or extension activities) call for development and potentially further research. Through the findings and the emergence of a substantive theory (§ 5.5), this work provides examples of exemplary practices and strategies to follow towards successful implement of ESD. In turn, the above-mentioned contributions have the potential to maximize the successful fulfilment of the 17 SDGs which are informative to educational leaders, educators, researchers, and policymakers.

CHAPTER 4: DATA ANALYSIS AND FINDINGS

4.1 Introduction

The collection and analysis of data were not treated as two separate processes but as a continuous, non-linear, iterative cycle (Nieuwenhuis, 2020). This repetitive cycle was used to achieve data saturation (when no new perspectives and ideas were forthcoming). The following steps were followed and repeated: (a) data were collected; (b) the data were reflected upon; (c) shortcomings of the data were identified; (d) steps were taken to address gaps and gather more data.

4.2 Data analysis

The research design and the data gathering technique was administered using the principles of grounded theory. Nieuwenhuis (2020) and Tie et al. (2019) state that the aim of grounded theory is to discover new theory through the systematic collection of data. In line with grounded theory, the collection and analysis of data occurred concurrently (Noble & Mitchell, 2016; Schneider et al., 2017). The principles of grounded theory were the best method of data collection and analysis in this study, as the goal was to identify an emerging theory.

To ensure the principles of grounded theory were followed during data collection and analysis, the following steps were taken (Foley & Timonen, 2014; Sbaraini et al., 2011):

- a) Transparency was shown throughout the study;
- b) Immediate analysis after collecting data occurred;
- c) During data analysis, coding and comparing were used;
- d) Memo-writing took place during data analysis;
- e) Theoretical sampling was used to fill gaps discovered after data analysis;
- f) Using the above-mentioned criteria as a guideline, a theory emerged which is described in chapter 5.

4.2.1 Method of analysis

Content analysis was employed to analyse the qualitative data. Yavuz (2016) describes content analysis as an organised process that involves the identification of relationships, themes, and concepts. Inferences can be made from three different types of documents, namely public records, personal documents, and physical evidence (Triad, 2016). Public records include official accounts of an institution's activity, such as mission and vision statements, relevant policies, reports, student handbooks, and long-term plans. Personal documents are accounts usually written in the first person which convey an individual's actions, beliefs, and experiences.

Diary entries, calendars, newspaper reports and e-mails are examples of personal documents. Physical evidence (artefacts) includes tangible objects found in the context being researched – for instance, flyers, posters, handbooks, and training booklets. Documents that can be classified as public records and physical evidence were used for the purpose of this study (Triad, 2016). Through exhaustive, methodical content analysis, the selected documents (see Appendix A) were analysed and compared for relationships, themes, concepts, and their relevance.

4.2.2 Coding process

Coding is a qualitative data analysis method that is used to understand data in relation to the research questions of a study. Coding is used to make sense of, comprehend, systematically analyse and finally present the data as something that can be reported (Elliot, 2018). In addition, the overall aim of data analysis in grounded theory is theory development, which is achieved through a thorough coding process (Elliot, 2018). To this end, a detailed and systematic manual colour-coding process of the text was conducted to code the 60 documents that were selected for the purpose of this study. The researcher initiated the coding process with open coding, followed by axial coding and continued with selective coding in order to develop theory (see figure 4.1, 4.2 and table 4.1). Axial codes lead to the identification of selective codes, which created a more manageable number of themes that were used to answer the research questions of this study. In addition, it became clear that certain documents spoke to specific research questions. The coding and data analysis process provided a better understanding of what the data revealed and determined how the data were to be organised and interpreted (Niemczyk, 2010). Analytical memoing occurred next to the selective coding column to track the researcher's thoughts and questions. Thereafter, the documents and codes were revisited, and new ideas, thoughts or questions were recorded in the analytical memo column (see table 4.1).

4.2.3 Open coding to axial coding to selective coding

Through the systematic coding process, a total of 129 open codes were identified, which involved breaking up the data into relevant parts. Next, axial coding occurred by examining the relationship between the concepts and categories created during open coding (Vollstedt & Razat, 2016). Axial codes were created using the words *core category*, *casual conditions*, *context*, *intervening strategy* and *actions and consequences* as headings. Furthermore, *casual conditions* refer to the development of an occurrence because of another phenomenon (Vollstedt & Razat, 2016). In the context of this study, compliance with sustainability mandates was identified as a core category. The core category (compliance with sustainability mandates) created six casual conditions (occurrences) which were used as themes: (a) inclusion of

sustainability in mission and vision statement; (b) sustainability-related content in the curriculum; (c) sustainability-related research beneficial to society; (d) pedagogical approaches that nurture sustainability-literate graduates; and (e) community engagement initiatives that improve conditions of society. Through revisiting and refining the codes, 129 open codes emerged, which were then grouped into axial codes by examining the relationship between concepts. As illustrated in figure 4.1, the axial codes served as categories, which resulted in the emergence of 13 selective codes. The selective codes became themes that informed the research questions of this study.

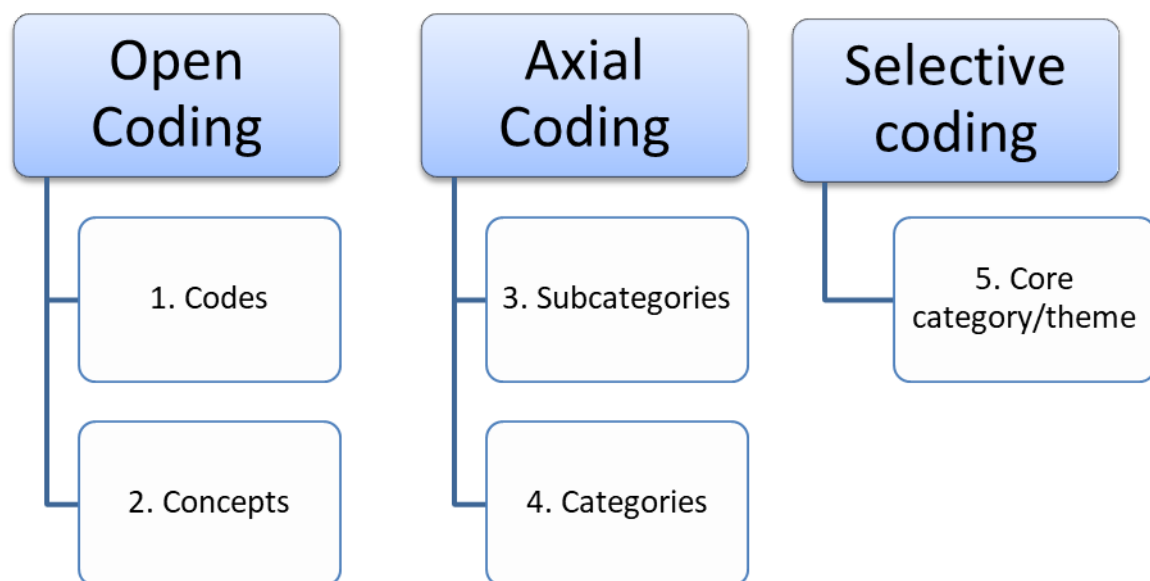


Figure 4.1: Simplified visual representation of coding process

Table 4.1: Excerpt of detailed coding process

Doc	Pg	Actual Text	Open Coding	Axial Coding	Selective coding= Themes	Analytical memo
BR5-DOC-1	p. 4	1. <u>University Vision And Major Strategic Topics Mission</u> To train conscientious, critical and technically qualified professionals and citizens, in the most diverse areas, prepared to transform reality and develop the country, in the construction of a more just, democratic, plural and sustainable society, through teaching, research, extension, management , culture, assistance, technological, social and public policy innovation acting as a public, free, secular and socially referenced university.	Sustainability in mission and vision	Sustainability in mission and vision	<i>Inclusion of sustainability in mission and vision statement</i>	HEI aims to achieve sustainability through teaching, research and extension.
SA5-DOC-1	p. 31	<u>Innovation and Social Leadership Strategic Objectives</u> (c)Strengthen Wits's role as a leading knowledge platform for social engagement with	Extension activities	Extension activities Responding to 21st-century trends in a sustainable manner Sustainable universities	<i>Community engagement initiatives that improve conditions of society</i>	Extension activities not mentioned much thus far

		contemporary issues. The University will put in place systems and mechanisms to encourage a balanced advancement of both commercial and public-good innovation.				
<u>JA-DOC-12</u>	p. 172	<u>Context 2009</u> The main sustainable development competencies consist of tools to cope with uncertainty, complexity and ambiguity. Such competencies include holistic understanding, communication and collaboration skills, ability and willingness for critical and reflective thinking, creativity, innovativeness, and entrepreneurship. It is quite obvious that these competencies cannot be achieved by simply adding new content to existing courses or creating new courses, and the idea is not to add a lot of content to an already full curriculum.	Maximising ESD: critical thinking	Maximising ESD: critical thinking Maximising ESD: democratic education Maximising ESD: extracurricular activities Maximising ESD: flexible curriculum Maximising ESD: interdisciplinary approach Maximising ESD: motivated individuals Maximising ESD: motivation Maximising ESD: multi-methodological approach Maximising ESD: pedagogical competencies Maximising ESD: place-based education Maximising ESD: problem-solving Maximising ESD: real-life contexts Maximising ESD: reflective thinking Maximising ESD: skills,	<i>Maximising ESD in the classroom</i>	

				knowledge and values Maximising ESD: transformative teaching methods Maximising ESD: values		
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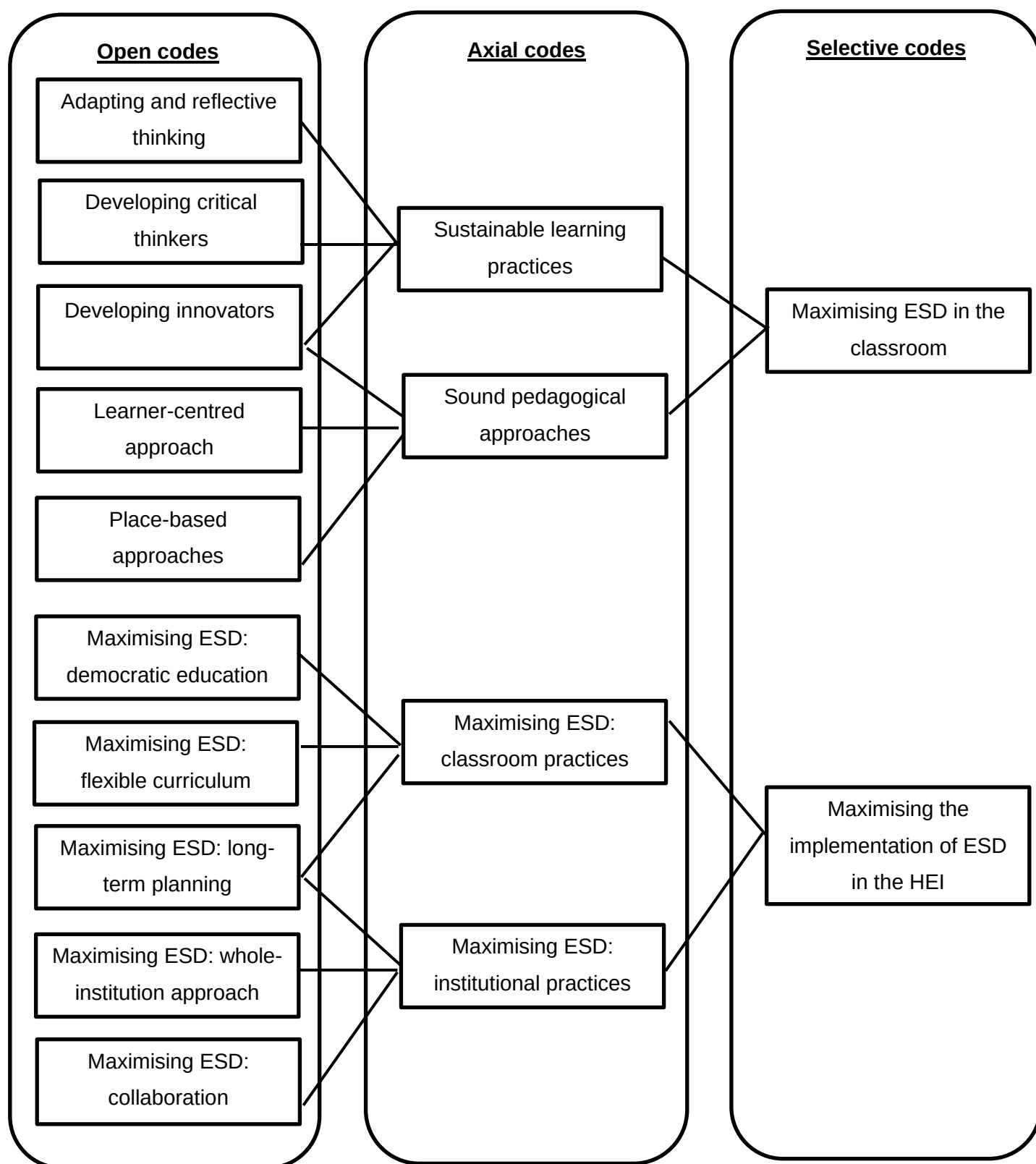


Figure 4.2: Visual representation of the formation of axial and selective codes

4.3 Summary of the procedures followed during data analysis

Content analysis was employed as qualitative data analysis research tool to systematically analyse the purposefully selected documents. The document analysis process was thorough, as it was guided by the principles of grounded theory. Sixty documents were manually colour-coded. Through a thorough coding process, 129 open codes emerged which were then grouped into axial codes by examining the relationship between concepts. The axial codes served as categories, which resulted in the emergence of 13 selective codes. Eventually, the selective codes became themes that provided answers to the research question for this project. The 13 themes are described and further elaborated on in the following section (§ 4.4).

The following table showcases the descriptors utilised to refer to a specific or combination of documents in the study findings (also see § 3.6.2).

Table 4.2: Symbolic identifiers for the document descriptors

Descriptors	Explanation of descriptors	Number of documents
SA-DOC	SA – institutional document from a South African HEI. DOC – document number.	20
BR-DOC	BR – institutional document from a Brazilian HEI. DOC – document number.	20
JA-DOC	JA – journal article exploring either the improvement of ESD or the status of ESD implementation in South Africa and Brazil. DOC – document number.	20

4.4 Findings

The purpose of this qualitative study was two-folded: first, to systematically examine relevant documents to explore the effectiveness of HEIs in South Africa and Brazil in implementing ESD; second, to provide recommendations for how HEIs in both contexts can maximise the implementation of ESD. Document analysis was conducted with four objectives in mind: (a) to determine the emphasis dedicated to SD in the mission and vision statements as well as in other strategic planning documents of HEIs; (b) to evaluate the alignment of the curriculum, research practices and learning practices at HEIs with the principles of SD; (c) to evaluate the implementation of sustainable practices and SD in extension activities in education; and (d) to identify ways South African and Brazilian HEIs can maximise the implementation of ESD.

The employment of document analysis using the principles of grounded theory for open coding, axial coding and, eventually, selective coding resulted in the emergence of 13 main categories, which are presented in this chapter as themes (see table 4.3). The 13 themes were grouped into four sections which correspond to the four research questions and form the outline for the discussion of the findings. The findings section was divided into four distinctive sections (§ 4.4.1–4.4.4) which correspond with the 13 themes as tabulated in table 4.3. The first section (§ 4.4.1) discusses the emphasis dedicated to SD in the mission and vision statements of HEIs. The use of sustainability and related terms (§ 4.4.1.1), compliance with sustainability mandates (§ 4.4.1.2) and inclusion of sustainability in mission and vision statements (§ 4.4.1.3) as themes were utilised as the sections of the discussion. The second section (§ 4.4.2) provides the findings on the alignment of the curriculum, research and learning practices at HEIs with the principles of SD. The third section (§ 4.4.3) evaluates the implementation of SD practices and SD in extension activities by exploring community engagement initiatives that improve conditions of society. The last section (§ 4.4.4) identifies methods HEIs can employ to maximise the implementation of ESD. The themes utilised as the subsections of the discussion are sustainability-related challenges within institutions (§ 4.4.4.1), sustainability-related challenges in the classroom (§ 4.4.4.2), HEIs' response to sustainability-related challenges (§ 4.4.4.3), maximising the implementation of ESD in HEIs (§ 4.4.4.4), and maximising ESD in the classroom (§ 4.4.4.5). As is evident, each section corresponds to a specific research question.

The layout and structure of the findings are tabulated below, indicating the themes and sections of the discussion that relate to each of the four research questions.

Table 4.3: Themes and sections of the discussion applicable to each research question

Themes	Sections of the discussion	Research question
The use of sustainability and related terms	Attention to SD in HEIs' formal documents	Research question 1 How much emphasis is dedicated to sustainable development in the mission and vision statements as well as in other strategic planning documents of higher education institutions?
Compliance with sustainability mandates		
Inclusion of sustainability in mission and vision statement		
Different realms of sustainability	Inclusion of SD principles in the curriculum, research and learning practices	Research question 2 How do the curriculum, research and learning practices at higher education institutions align with the principles of sustainable development?
Sustainability-related content in the curriculum		
Sustainability-related research beneficial to society		
Pedagogical approaches that		

nurture sustainability-literate graduates		
Community-engagement initiatives that improve conditions of society	Implementation of SD sustainable practices in extension activities	Research question 3 How do higher education institutions implement sustainable practices and extension activities in education?
Sustainability-related challenges within institutions	Maximising the implementation of ESD	Research question 4 How can South African and Brazilian higher education institutions maximise the implementation of education for sustainable development?
Sustainability-related challenges in the classroom		
HEIs' response to sustainability-related challenges		
Maximising the implementation of ESD in the HEI		
Maximising ESD in the classroom		

4.4.1 Attention to sustainable development in HEIs' formal documents

The analysed documents conceptualised adoption as the act of accepting or committing to use something new or different, whereas the implementation of ESD is considered as a set of planned stages which are systematically linked to put a plan into action. Thus, the mere adoption of a strategy does not imply its implementation (JA-DOC-6). This section evaluates the extent to which Brazilian and South African HEIs adopt sustainability values, principles and strategies in their formal documents.

4.4.1.1 The use of sustainability and related terms

Inconsistent definitions and misconceptions hinder the successful implementation of ESD (Tierney et al., 2016:510). According to Da Silva et al. (2019:238), a lack of understanding of the concept of sustainability is leading to poor implementation. Therefore, educational leaders should clearly define sustainability-related terms by providing definitions and addressing the above-mentioned misconceptions.

In the context of Brazil, sustainability is conceptualised as taking actions that are ecologically correct, socially fair, and economically viable and sensitive to the local culture. According to the

analysed documents, actions in the form of research, teaching and extension activities should prioritise environmental, social and economic stewardship and consider the potential impact on future generations (BR4-DOC-1). South African HEIs, on the other hand, conceptualise two sustainability-related terms. The first term is *systematic sustainability*, which involves people, place (social), prosperity (economic), and the environment. Systematic sustainability seeks to encourage responsible institutional management (SA4-DOC-2). Secondly, SA1 and SA4 define sustainability as development that meets the needs of the present without compromising the ability of future generations to meet their own needs (SA1-DOC-1; SA4-DOC-1). HEIs in both countries agree that it is crucial for sustainability-related knowledge, decisions, and actions to include economic, environmental, and social dimensions (SA1-DOC-1; SA4-DOC-1). One of the South African institutions' (SA4) economic, environmental, and social realms of sustainability are defined. The economic dimension encompasses financial restraints, the entrepreneurial university and innovative funding models. The environmental dimension involves ecological elements, both in curriculum and operations. The social dimension deals with topics of inclusion, student and staff wellness, corporate citizenship, and social cohesion (SA4-DOC-1).

The definition for sustainability-related terms such as ESD, SD and sustainability are defined slightly differently by Brazilian and South African HEIs. However, it is encouraging to note that the HEIs under investigation have conceptualised sustainability and related terms. The concern though is that there is a lack of co-operation from other HEIs, as sustainability and related terms are only defined by two South African HEIs (SA1-DOC-1; SA4-DOC-1) and two Brazilian HEIs (BR4-DOC-1; BR5-DOC-4; BR5-DOC-5). South African HEIs provide a clear definition on what sustainability means in their context, whereas Brazilian HEIs are not as concise, thus Brazilian HEIs can learn from South Africa in this regard. The successful implementation of ESD not only requires a clear understanding of key terminology and what they mean in the context of the HEI; the role and responsibility of staff and students towards the attainment of sustainability should also be clearly articulated.

4.4.1.2 Compliance with sustainability mandates

The emergence of several national and international sustainability-related policies, strategies, goals, and objectives has stimulated HEIs to align their teaching, research, extension, daily operations and strategic documentation with requirements stipulated in sustainability mandates. Compliance with sustainability mandates is beneficial to HEIs for two reasons. Firstly, HEIs would reduce their overhead cost of operating, as they would use less electricity, fuel, and paper (JA-DOC-6). Secondly, global university rankings – such as the Times Higher Education Impact Rankings and the Quacquarelli Symonds World University Ranking – consider the

contribution HEIs make towards the attainment of the UN SDGs as ranking criteria, especially in terms of research (JA-DOC-10; Top universities, 2021). HEIs mention their aim to gain a competitive advantage (SA4-DOC-2), and when they are ranked highly in global rankings, they can attract the best students and staff, attract sustainable funding, and attain a credible, prestigious reputation. This subsection explores the extent to which sustainability mandates have been adopted in the Brazilian and South African higher education sector.

The Brazilian HEIs under investigation have shown their commitment to ESD by adopting sustainability strategies and becoming members of the following organisations:

Evidence of compliance	Reference
The United Nations Global Compact	(JA-DOC-2)
The Talloires Declaration	(JA-DOC-2)
The Association for the Advancement of Sustainability in Higher Education	(JA-DOC-2)
The Talloires Network	(JA-DOC-2)
Assistance for participation in the United Nations Conference on Sustainable Development	(BR6-DOC-2)
HEIs are committed to align their operations, values, research, and curriculum and community engagement with the 17 SDGs as outlined by the 2030 Agenda for SD	(BR1-DOC-1; BR2-DOC-1; BR4-DOC-1; BR5-DOC-1; BR6-DOC-2).

Like Brazil, the South African higher education sector has signalled its desire to support its national government and international organisations' SD aspirations through their core activities of teaching and learning, research, and a variety of institutional operations. It was clear in the analysed documents that the rate at which SD-centred strategies have been adopted by South African HEIs has increased in recent years. Many of these strategies have been enunciated at the strategic level in the form of policy documents, vision and mission statements (JA-DOC-6). Below are examples of some of the SD strategies and charters adopted by South African HEIs:

Evidence of compliance	Reference
The United Nations Global Compact Charter	(JA-DOC-6)
The National Strategy on Sustainable Development	(JA-DOC-6)
The Global Alliance of Universities on Climate	(SA4-DOC-2)
HEIs are committed to align their operations, values, research, and curriculum and community engagement with the 17 SDGs as outlined by the 2030 Agenda for SD	(SA1-DOC-2; SA1-DOC-4; SA4-DOC-1; SA4-DOC-2; SA5-DOC-2; JA-DOC-7).

It is promising to note that a South African HEI (SA6) has established a sturdy foundation towards attaining the SDGs, as the HEI has been implementing initiatives aligned with the 17 SDGs even before the SDGs were proclaimed. However, an emerging concern is that when

comparing the reorientation of higher education in South Africa and the infusion of the SDGs into the international norm, findings reveal that South African HEIs are in the early stages of implementation. The biggest factor limiting the contribution of South African HEIs to the SDGs lies in insufficient funding directed towards SD initiatives and projects in comparison with international norms. In fact, the visible funding limitations to developed countries such as South Africa and Brazil are revealed through comparison of SD initiative budgets in developed and developing countries. For instance, in the case of South Africa, US\$3,000–US\$6,200 was spent on a park project, as opposed to a similar international project which received US\$33m (JA-DOC-7).

Globalisation as a trend of the 21st century has made it necessary for organisations to collaborate to address challenges and to capitalise on opportunities (SA4-DOC-1). Scholarly literature recommends that HEIs in developed and developing countries seek partnership with one another (through teaching, learning, and research), which would contribute to the skillset and sharing of competencies in developed and developing countries (O'Malley, 2020; Rampasso et al., 2020:3). Partnership is necessary to attain funding for infrastructure, especially in developing countries. It is encouraging to note that more than half of the South African HEIs under study have adhered to the recommendations made by recent scholarly literature, as they prioritise partnership and seek to form alliances with national and international institutions, organisations, and academics (SA5-DOC-1; SA1-DOC-2; SA4-DOC-1; SA5-DOC-1). It is important to note that South African HEIs' main partnership agenda is to improve the research capacity of their institutions. One South African HEI (SA4) aims to increase the number of active international research partnerships, increase the number of international students at postgraduate levels, increase the number of awards and prizes for academic and research achievements, and increase the number of active international partnerships and research collaboration (SA1-DOC-1). In addition, partnerships have been formed to improve the social impact South African HEIs have on society. In this regard, notable partnerships have been formed with the Danish Embassy in South Africa, the Security Institute for Governance and Leadership in Africa, and the Academic Council of the United Nations (SA4-DOC-2).

The HEIs under investigation are not only diligently complying with the criteria and goals of sustainability mandates. They are also cognisant of the requirements stipulated in global university ranking systems. Brazilian HEIs boast about their current standings in global university rankings as well as their aspirations to improve on their current ranking (BR2-DOC-4; BR-8-DOC-2; BR5-DOC-1). The attention dedicated to global university rankings is because global rankings display the successes of a specific HEI on a national and international stage, which, amongst others, also enables internationalisation. BR5 has been ranked among the best

100 HEIs in the world for their exceptional focus on topics of social sustainability, which include health and well-being, reducing inequalities, and gender equality (BR5-DOC-1).

Similarly, South African HEIs are recognised as businesses that must apply business principles to prosper. Scholastic skills such as intellectual leadership and academic scholarship are necessary for HEIs to thrive; however, these are no longer lone competencies to ensure prosperity. An additional set of skills, such as efficient management, political networking and fundraising skills, are also of utmost importance. The survival of world-class universities is reliant on the ability of each institution to generate wealth, allocate resources, and use business systems to support the academic enterprise (SA5-DOC-1). All the South African HEIs under investigation signal their desire to improve global rankings to gain a competitive business advantage more than their Brazilian counterparts (SA1-DOC-1; SA2-DOC-2; SA3-DOC-2; SA4-DOC-1; SA3-DOC-4; SA4-DOC-2-SA5-DOC-1; SA5-DOC-2). Furthermore, South African HEIs view global rankings as indicators of successes and shortcomings that can serve as a tool to maintain high standards and accountability (SA4-DOC-1).

4.4.1.3 Inclusion of sustainability in mission and vision statements

In order to equip citizens with the necessary skills, knowledge and values to achieve a more sustainable society, the institutional culture of HEIs should be committed to the principles of sustainability. It is imperative for the above-mentioned to be manifested through the mission, vision, strategy, and actions of HEIs (JA-DOC-9). According to Özdem (2011), international organisations such as the European Union, the UN, and the World Bank conduct regular studies on the changes in HEIs globally. Consequently, quality assurance principles and standards in the form of strategic planning and reports were introduced. The publications of documents that contain the strategic planning of HEIs are now seen as an essential requirement for HEIs globally. Strategic planning aims to create a culture that supports the mission and vision of the institution, and all decisions and actions should contribute to the fulfilment of the mission and vision. Strategic planning consists of four key components – namely (a) mission; (b) vision; (c) strategy; and (d) action – which are subsequently used as points for discussion (Özdem, 2011).

After an analysis of the (a) mission and (b) vision statements of the Brazilian HEIs under investigation, four notable findings emerged. Firstly, the social and environmental realms of sustainability are prioritised, often to the exclusion of the economic dimension, by the majority of HEIs (BR2-DOC-4; BR2-DOC-4; BR4-DOC-2; BR5-DOC-5; BR5-DOC-1; BR6-DOC-1; BR6-DOC-2; BR7-DOC-1; BR8-DOC-1). However, there are minority cases where HEIs reveal their commitment to all three dimensions of sustainability (BR7-DOC-1; BR6-DOC-2; BR5-DOC-1). Secondly, half of the Brazilian HEIs aim to utilise their resources to reduce inequalities and

contribute to the realisation of a fair, just society (BR4-DOC-2; BR5-DOC-1; BR7-DOC-1; BR8-DOC-1). Thirdly, and in line with a fair, just society, is the goal of achieving social justice (BR2-DOC-4; BR7-DOC-1). Lastly, the promotion of multidisciplinary (BR8-DOC-2) and interdisciplinary (BR3-DOC-1; BR5-DOC-5) actions in areas of teaching, research and SD in extension activities are encouraged to solve societal challenges. In the case where HEIs do not refer directly to sustainability in their mission statements, they aim to develop citizens that are innovative and seek solutions to the challenges of society (BR4-DOC-1).

Further findings emerged when zooming in on individual institutions. BR4 identified the need for faculties of each of their campuses to expand in order to fulfil the University's mission by incorporating the concept of sustainability into the core activities of the HEI. This requires medium- and long-term planning and a commitment from staff and students to comply with sustainability requirements (BR4-DOC-2). Furthermore, the mission statements of individual departments (economics, pharmaceutical sciences, and engineering) (BR3) revealed that they intend to contribute to SD by educating professionals in an interdisciplinary manner and by equipping them with competencies that enable the improvement of the economic, environmental and social realms of society (BR3-DOC-1).

As regards (c) strategy and (d) action, Brazilian HEIs intend to adopt three strategies that hold the potential to put the aspirations stipulated in their mission and vision statements into action: firstly, research is to be conducted in a manner that responds to societal challenges; secondly, staff are to employ sound pedagogical methodologies in their teaching to train professionals capable of actively living out the mission and vision of the institution in their daily lives; lastly, resources are to be utilised to improve the economic, social and environmental conditions of the communities that host them, specifically through SD in extension activities. Furthermore, institutional values and culture guiding the actions and strategies of staff and students in the HEIs are based on the principles of sustainability, equality, human rights, and ethical socio-economic development (BR5-DOC-5; BR6-DOC-1).

In the South Africa context, strategies have been enunciated at the strategic level in more than half of South African HEIs in the form of policy documents and vision and mission statements (JA-DOC-6). The strategic documents published by South African HEIs were investigated to uncover the extent to which their goals, values, and mission and vision statements included the principles of sustainability. The (a) vision and (b) mission statements of South African HEIs included four sustainability-related features. The first finding is that the social, environmental and economic dimensions of sustainability are priorities (SA1-DOC-1; SA4-DOC-1). The second finding is grounded in the fact that the realisation of social justice is at the heart of HEIs operations and actions (SA1-DOC-1; SA3-DOC-1). The third finding is that HEIs are at the

service of society and encourage research that is multidisciplinary and interdisciplinary in nature (SA4-DOC-1). Lastly, HEIs are committed to enhancing their societal impact (SA4-DOC-1; JA-DOC-6) by engaging with challenges in natural and social settings (SA4-DOC-1; SA3-DOC-1).

With (c) strategy and (d) action as a frame of reference, South African HEIs utilise their core activities (teaching, research and extension activities) as sources of action towards the realisation of their mission and vision statements (SA3-DOC-1; JA-DOC-6). South Africa takes a unique approach to achieving their mission and vision, as it seeks to form partnerships (SDG 17) with entities in developed and developing countries (SA3-DOC-1). SA4-DOC-1 is of the belief that valuing diversity, improving student access and systemic sustainability as strategies have the most potential to achieve their mission and vision.

4.4.1.4 Alignment of the curriculum, research and learning practices at HEIs with the principles of sustainable development

ESD is not a new concept, as the term has been used in discourse by international organisations such as UNESCO since the late 1980s. Since then, the term has evolved, gained stronger academic momentum and attention annually, as more businesses and governments have been calling for education to develop citizens with the ability to innovatively contribute to capitalising on the opportunities and challenges presented by SD (JA-DOC-8). Infusing the daily operations of HEIs with responsible consumption of energy, water and food would ensure that HEIs function as a sustainable community and serve as an exemplary example to other institutions and citizens (JA-DOC-9).

4.4.2 Inclusion of sustainable development principles in the curriculum, research and learning practices

An HEI that is truly sustainable would echo ecologically sound, socially just and economically viable sustainability-related knowledge, skills and values across their curriculum, teaching, research and extension activities (JA-DOC-9). In addition, the implementation of strategy should not only consider the three dimensions (environmental, social and economic) of sustainability but also the five dimensions of their core institutional activities, namely teaching, research, operations, extension activities, and reporting (JA-DOC-2).

4.4.2.1 Different realms of sustainability

With the aforementioned as a frame of reference, this section elaborates on the extent to which ESD is promoted in Brazilian and South African HEIs. Reasons are provided for the overemphasis of and commitment to the environmental dimension of sustainability.

It is evident that Brazilian and South African HEIs do not directly mention the words *education for sustainable development* in the analysed documents. However, ESD is referred to by one Brazilian HEI (BR6) that intend to utilise their core activities to nurture professionals and researchers capable of endorsing democracy, citizenship, human rights, social justice, and environmental ethics (BR6-DOC-2). Meanwhile, one South African HEI (SA5) strives to nurture students in a full range of intellectual and social activities that will develop responsible citizens equipped to contribute to a sustainable society (SA5-DOC-1). Cultivating graduates with the capacity to capitalise on the challenges and opportunities presented by SD is promising. However, the concern is that the other HEIs under scrutiny remain disengaged.

Brazilian HEIs do not effectively integrate the different realms of sustainability into their core activities, as the environmental dimension is prioritised (JA-DOC-8). Brazilian HEIs have become aware of their impact on the environment and have addressed this by prioritising efforts towards improving their understanding of the environmental dimensions of their daily operations (JA-DOC-1; JA-DOC-2). As is evident in the data, the disproportionate emphasis on the environmental realm of sustainability is prevalent for four reasons. Firstly, educators find complexity in teaching the social dimension of sustainability, as opposed to the environmental dimension. The environmental dimension is tangible, quantifiable and easily defined, as opposed to the social dimension (JA-DOC-8). Secondly, Brazilian Federal Law 9795/1999, regulated by Decree 4281/2002 (Brazil, 2002), oversees environmental education, necessitating that it be included in training and specialisation courses in all professional areas. Despite existing legislation, environmental education in most HEIs is confined to isolated actions. Furthermore, a lack of training and professional development for educators gives rise to a lack of theoretical, methodological and teaching skills required to effectively teach environmental education (JA-DOC-5). Thirdly, the analysed documents as well as the nature of international networks and partnerships indicate that campus greening and sustainable practices have become mainstream. Thus, in HEIs globally, initiatives that focus on environmental initiatives are prioritised and reported on (JA-DOC-2). Lastly, HEIs form a community of individuals and their daily operations entail a wide spectrum of facilities and activities such as dormitories, restaurants, which generate waste, thus making effective environmental practices imperative (JA-DOC-2). It is promising that there are existing cases in the literature regarding sustainability insertion in higher education. However, most of the findings in the scholarly literature, research reports and institutional development plans reveal that there is a focus on environmentally sustainable practices instead of a holistic approach to ESD (JA-DOC-1; JA-DOC-4; BR4-DOC-2; BR5-DOC-1; BR5-DOC-3; BR6-DOC-1; BR6-DOC-2; BR8-DOC-1; BR8-DOC-2; BR8-DOC-3).

Like Brazil, the majority of South African HEIs allocate a large proportion of their sustainability efforts towards environmental sustainability and engage mainly in environmental practices (JA-DOC-7; SA2-DOC-2; SA2-DOC-3; SA4-DOC-2). In this regard, South African HEIs respond to sustainability as a 21st-century trend by grounding their core activities in environmental practices for two reasons. The first reason is the urgent need to respond to climate change as a 21st-century trend. Africa is vulnerable to climate change due its location, unique biodiversity, and its limited potential to adapt (SA5-DOC-1). Scholars predict climate change to manifest itself in shorter, more extreme weather patterns across the continent, causing droughts, abnormal rainfall, and heat waves which will cause natural disasters such as landslides and floods (SA5-DOC-1). These environmental phenomena catalyse social and economic implications in the form of famine, inequality, and a decrease in economic growth (SA5-DOC-1). A second reason for the considerable focus on implementing environmental practices instead of ESD is that there is complexity and lack of conceptual clarity associated with ESD, which leads to the vagueness, ambiguity, and poor understanding of the concept (JA-DOC-3). The danger of vague and ambiguous concepts is that they easily allow policymakers and educational leaders to give the impression that they intend doing one thing when, in fact, they are implementing something quite different (JA-DOC-3). Green campus initiatives (waste management, energy and water saving, and sustainable consumption) are well-implemented and proudly showcased by the Brazilian and South African HEIs under study (JA-DOC-2). Furthermore, environmental education and practices are not limited to the environmental dimension. Environmentally sustainable practices often serve a human interest and are a catalyst for social change and economic transformation by reducing social inequalities and creating wealth and well-being (JA-DOC-3; BR1-DOC-1; BR5-DOC-1; BR8-DOC-2). In addition, several Brazilian and South African HEIs are institutionalising SD into their core activities, as the number of sustainability coordinators and environmental managers are increasing (JA-DOC-2).

Despite the disproportionate attention being paid to environmental sustainability, there is evidence that considerable attention is also paid to the social and economic realms of sustainability. More specifically, management of Brazilian and South African HEIs make positive sustainability-related decisions, as the HEIs under study prioritise decisions that secure (a) institutional sustainability, (b) financial sustainability, and (c) balancing the demographic dynamics of their staff and students to be representative of race, gender, and social class.

In the context of Brazil, institutional sustainability is governed by processes aimed at improving the quality of life of staff and students, infrastructure, accessibility, safety, and sustainability of their buildings (BR5-DOC-1). South African HEIs have a similar approach to institutional sustainability; however, South African HEIs are more concerned about the effects of globalisation as a trend of the 21st century, as 30 000 home-grown specialist and professionals

leave the continent annually (SA5-DOC-1). As a response, the majority of South African HEIs are committed to academic sustainability by preventing brain drain through developing and attracting highly skilled, research-orientated academics by supporting staff to attain doctoral and equivalent qualifications. Thus, preparation for the next generation of academics is essential to South African HEIs (SA1-DOC-1; SA4-DOC-2; SA3-DOC-1; SA5-DOC-1).

Brazilian HEIs prioritise the financial sustainability of their institutions for three reasons (BR4-DOC-2; BR6-DOC-1; BR6-DOC-2; BR7-DOC-1). The first reason is that the ability to analyse and respond to strategic and operational risks such as budgetary constraints is critical to maintain the financial sustainability and survival of HEIs (BR5-DOC-1). The second reason is embedded in the uncertain nature of state funding towards education, which has declined in Brazil (BR2-DOC-4). The last reason is that transformations occur rapidly in today's world (as an example, the emergence of Covid-19 has given rise to many changes in society), and it is possible that procedures that work well today will not be effective tomorrow, thus posing a threat to the financial sustainability of HEIs. To ensure that Brazilian HEIs are prepared for any periods of resource scarcity, the financial health of Brazilian HEIs is prioritised (BR2-DOC-4). Potential avenues to improve the financial sustainability of Brazilian HEIs include expanding fundraising from public-private partnership, improving policies to increase revenue, expanding participation in national and international projects, training managers, increasing equity in distribution of resources, seeking financial resources from the state government, and expanding the use of renewable technologies and energy. Similarly, the higher education sector in South Africa has experienced a decrease in public funding. The decline in public funding has hindered educational quality, student enrolment, research productivity, and the development of the next generation of academics. Consequently, all of the South African HEIs under investigation have taken exhaustive measures to ensure the financial sustainability of their institutions (SA1-DOC-1; SA2-DOC-2; SA2-DOC-3; SA3-DOC-1; SA3-DOC-3; SA4-DOC-1; SA4-DOC-2; SA5-DOC-1). The following strategies are employed to protect the financial sustainability and long-term survival of their institutions (SA1-DOC-1; SA3-DOC-1; SA5-DOC-1; SA4-DOC-2):

- optimising the income generated from intellectual property and government subsidy by ensuring efficiency in teaching and research;
- intensifying commercial projects to secure resources through government grants, philanthropy, and private business donations;
- utilising the strategic resource allocation model to strategically distribute funds;
- expanding internationalisation and attracting funding from international sources;
- developing new sources of income and new business models for future financial sustainability.

In the contexts of South Africa and Brazil, balancing the demographic dynamics of staff and students to be representative of race, gender, and social class is a priority. As is evident, BR4 increases the admission number of students from lower economic strata (BR4-DOC-1). Meanwhile, most South African citizens have experienced a history of structural oppression (SA5-DOC-3). This reality has prompted South African HEIs to pay special attention to social sustainability and social justice. All the South African HEIs under investigation ensure that their enrolment rates are in line with the demographic representation of the country in terms of race, gender (SDG 5), and socio-economic status (SA1-DOC-1; SA2-DOC-2; SA2-DOC-3; SA3-DOC-3; SA4-DOC-1; SA4-DOC-2; SA5-DOC-3; JA-DOC-7). In addition, HEIs intend to increase the representation of marginalised groups such as Black women and disabled citizens in their postgraduate courses so as to diversify the profile of academics (SA3-DOC-1).

It is concerning that a lack of understanding and minimal effort towards ESD manifest in the core activities of Brazilian and South African HEIs. It is clear that the substantial efforts performed throughout the UN Decade on Education for Sustainable Development have done little to improve institutional commitment to and understating of ESD in the contexts of South Africa and Brazil (JA-DOC-2). Although the core activities of Brazilian and South African HEIs show promising indicators of education being reoriented towards ESD, tertiary education appears to be ineffective in operating as an effective catalyst of societal change (JA-DOC-4). To this end, there are opportunities for improved implementation, specifically as regards incorporating the different realms of sustainability into the core activities of Brazilian and South African HEIs (JA-DOC-4).

4.4.2.2 Sustainability-related content in the curriculum

South African HEIs are making considerable contributions to achieving the national SD objectives, which has led to calls for the transformation of the curriculum (JA-DOC-6). One South African HEI (SA2) has responded to the calls for transformation, as the institution utilises their curriculum to prepare students for active global citizenship and for the world of work. An additional dimension is added to the curriculum to extend beyond the classroom to include opportunities for internships and service learning, creating a link between the curriculum and industry (SA2-DOC-2). With regard to the curriculum of Brazilian HEIs, there is one HEI (BR8) that shows a commitment to reorientating the curriculum towards nurturing socially and environmentally responsible graduates (BR8-DOC-1). For the reorientation and transformation of the curriculum towards sustainability to be a reality, curricular flexibility is an imperative prerequisite. To this end, it is encouraging to note that Brazilian and South African HEIs have a flexible curriculum, which is needed, as sustainability is dynamic and ever-

changing (BR4-DOC-2; BR6-DOC-2; BR7-DOC-1; SA4-DOC-2; SA5-DOC-3). Brazil and South African HEIs' curriculums are flexible, as they are constantly being renewed and updated to (a) create opportunities for interdisciplinary dialogue among different scientific fields, (b) ensure lifelong learning, and (c) respond to 21st-century trends such as employability and the need for distance learning (BR4-DOC-2; BR6-DOC-2; BR7-DOC-1; SA5-DOC-3). Looking specifically at the case of South Africa, the curriculum is updated regularly with the latest societal, economic and global events (SA5-DOC-3).

Looking at the contexts of South Africa and Brazil in isolation, the curriculum of Brazilian HEIs reveals three promising developments. The first finding is that BR5 and BR8 are committed to including current, local and global content into their curriculum. The curriculum content consists of multiple economic, social and environmental perspectives as well as opportunities that promote ethical and responsible action in society (BR5-DOC-1; BR8-DOC-1). As is evident, topics and initiatives related to affirmative action, diversity, human rights, inclusion, and the environment are supported and promoted (BR6-DOC-2). The second finding is that BR4 encourages daily sustainable actions that promote quality of life and promotes the practice of environmental preservation and a green campus. In turn, this would create opportunities to insert sustainability content into daily teaching (BR4-DOC-2). The last finding is that two Brazilian HEIs (BR7 and BR8) offer courses that use sustainability as a core topic. For instance, the Program of Studies and Propositions about the Semi-arid aims to make recommendations to policymakers for the SD of the Semi-arid region (BR7-DOC-1). BR8 has nine academic departments which are overseen by three centres – one being a centre dedicated to Science and Technology for Sustainability (BR8-DOC-2). In addition, BR8 offers a master's degree covering sustainability in environmental management (BR8-DOC-1).

The curriculums of South African HEIs focus on sustainability content within faculties and courses students are taught. In the context of SA4, sustainability was found to be prevalent in the curriculum of three faculties. Firstly, the Faculty of Theology recognises its position and potential to encourage transformation in the form of sustainability-related actions. To that end, the Faculty partners with government to incorporate social and planetary sustainability into their curriculum. Faith communities are a powerful driver for transformation, as 80% of the world's population conforms to a religion (SA4-DOC-2). Secondly, the Faculty of Engineering is in an ideal position to make important contributions to the systemic sustainability and transformation of the university. The faculty also delivers graduate engineers that possess the necessary competencies and the capacity to assist in improving the economy and improving the quality of life of all South African citizens (SA4-DOC-2). Thirdly, through its curriculum of legal education

and social impact activities, the Faculty of Law contributes to the broadening and strengthening of legal science and social justice locally and abroad (SA4-DOC-2).

Additional examples of sustainability in the curriculums of South African HEIs include:

- SA4 offers an Advanced Diploma in Sustainable Development (SA4-DOC-2);
- SA3 offers a course in Construction Economics and Management which covers increasing global and national focus on environmental sustainability as a topic (SA3-DOC-3);
- the Faculty of Art incorporates topics such as social justice and human rights perspectives into its curriculum (SA2-DOC-3);
- the Faculty of Engineering and Built Environment is introducing new programmes and aligning graduate-level work with the UN's SDGs (SA2-DOC-3).

Through the formal curriculum and co-curricular activities, a South African HEI (SA5) seeks to nurture the following attributes in all of its students (SA5-DOC-3):

- awareness of the imperative for development to be environmentally sustainable;
- concern for social justice, and a commitment to high ethical standards and dignity of all people;
- ability to innovate and engage critically with diverse perspectives and sources of information;
- recognition of the importance of humaneness and compassion in addressing social and technical issues.

As is evident from the above-mentioned findings from the Brazilian and South African contexts, SD is included in the curriculum and is extensively covered throughout courses and programmes (JA-DOC-2). However, ESD is poorly inserted and the curriculums of Brazilian and South African HEIs do not contain enough detail on ESD. Although the attempt to include ESD is evident, it is implemented in fragmented parts which often lack consistency and links in the curriculums of the sampled HEIs. The implementation of sustainability topics in the curriculum is present in the sampled universities for this study; however, the mere inclusion of SD topics in curriculum content does not equate to implementation of ESD. The inclusion of sustainability-related content occurs at different levels, depending on the course (JA-DOC-2). For instance, courses directly linked to sustainability (Advanced Diploma in Sustainable Development) incorporate sustainability-related knowledge, skills and values into the curriculum, while most courses not directly linked to sustainability fail to do so. There are exceptions, as the Faculty of Art incorporates themes such as social justice and equality. However, this occurs occasionally

and not frequently. To this end, sustainability-related content is being added to the curriculum of both Brazilian and South African HEIs; however, lack of consistency and breakages in links between different sustainability topics and dimensions lead to the conclusion of non-effective (holistic) ESD implementation, as is explained in one of the analysed documents (JA-DOC-14). The poor implementation of ESD in the curriculums stems from academic research productivity pressures such as publications and research grants.

4.4.2.3 Sustainability-related research beneficial to society

Sustainability-related research conducted by HEIs is a key driver of behavioural changes towards the use of natural resources in the daily lives of citizens (JA-DOC-7). Research has a key role to play in the context of addressing challenges in a resource-constrained world where inequalities continue to manifest, specifically in Africa and the global South (SA1-DOC-1). Scholars agree that one of the most pressing challenges of the 21st century is achieving the long-term goal of sustainability. As an effective response, topics such as sustainability (in all dimensions), human rights, social justice, and gender equality are forerunning themes embedded in research conducted by the investigated Brazilian and South African HEIs (BR4-DOC-1; BR6-DOC-2; SA1-DOC-1; SA4-DOC-2; SA5-DOC-2). In addition, the main goal of research is to be beneficial to society on a national, continental and global scale, which is achieved through multidisciplinary, interdisciplinary and transdisciplinary research, leading to ground-breaking innovations (BR4-DOC-1; BR5-DOC-1; BR6-DOC-2; BR7-DOC-1; SA1-DOC-2; SA3-DOC-4; SA4-DOC-1; SA4-DOC-2).

Zooming in on the case of Brazil, scientific research is integrated and aligned with teaching, extension activities and policy (JA-DOC-6). Furthermore, BR5 includes local societal needs as a component in the criteria for conducting research (BR5-DOC-1). BR2's sustainability-related research themes include topics such as the hydrological cycle and water resilience; sustainable cities and sustainable exploitation of natural resources; educational and social transformation for environmental sustainability and human well-being; sustainable food production; conservation and climate change (BR2-DOC-3).

In the case of South Africa, the research output per staff member at SA4 has almost doubled over the past 20 years. Research at the institution (SA4) does not only show promising quantitative developments; the socio-economic impact and the scope of research have also expanded. Research themes at SA4 are aligned with topics of national interest, such as the improvement of secondary education, the provision of health care to impoverished communities, urban development, inequality, sustainability, and energy security. Meanwhile, SA3 houses a large percentage of South Africa's leading international scholars in their respective fields – thus,

it is no surprise that the institution is conducting research that contributes to the environmental, social and economic realms of sustainability. SA3 conducted social research on gender inequality amidst Covid-19, as women in South Africa still face deeply embedded inequalities that affect their access to health care, education, and new technology. The researchers focused on women in relation to food security, new digital technologies, reproductive labour, and young motherhood to better understand the ongoing challenges that women face, now aggravated by the Covid-19 crisis (SA3-DOC-2). The pandemic has led to a greater urgency to find new ways to address the world's challenges. SA3 believes that not only can the coronavirus be conquered through research but so, too, can the formation of a more just and equitable post-Covid-19 world (SA3-DOC-2). Similarly, through research, Brazilian HEIs have played a critical role in better understanding ways to control and combat the virus and its associated challenges (BR5-DOC-2). In the context of SA5, environmental research was conducted by climate scientists, developing the first Earth system model based in Africa which will contribute to the fight against climate catastrophes (SA5-DOC-2).

In terms of the SDGs, two findings are forthcoming. The first is that Brazilian and South African HEIs follow the recommendations of SDG 17 as to seeking national and international partnerships to achieve sustainability. Through partnerships with institutions located in developed and developing countries, HEIs aim to strengthen their research potential and capacity (BR5-DOC-1; BR7-DOC-2; SA4-DOC-2). For instance, SA3 partnered with another South African HEI (SA7) to examine the extent to which South African children were at risk during the lockdown. The research revealed that 60% of children in South Africa live below the poverty line. The statistics were exacerbated by the emergence of Covid-19 and by the introduction of national lockdowns. The researchers recommended that the best intervention to protect children from starvation was through the South African social grant system. In terms of international collaboration, SA3 joined experts from Europe, the United Kingdom, South America, and North America in a €11.5 million initiative that assessed the current and imminent environmental risks posed by climate change, natural disasters, and human activities (SA3-DOC-2). The second finding is that South African HEIs systematically align their research themes with the 17 SDGs goals (SA3-DOC-2). Five aspects of the research conducted by South African HEIs reveal their commitment to the realisation of the SDGs. Firstly, the research themes of SA1 and SA3 are steered by the SDGs, as is evident from the SDG icons that appear throughout the annual research reports. As a result, a large portion of the research conducted by SA1 and SA3 is closely aligned with the SDGs (SA1-DOC-2; SA3-DOC-2). Secondly, a South African HEI (SA6) conducts research in areas ranging from green transport, green economy, climate change, climate smart agriculture, sustainable tourism, water quality, ecotoxicology, bioremediation, air quality, green universities, and ecology, among others. These

research topics are linked to sustainability and contribute especially to the realisation of SDGs 6, 7, 9, 11 and 13 (JA-DOC-7). Thirdly, SA1 pursued an array of transdisciplinary research projects focused on all 17 SDGs. The HEI research work that pays attention to the SDGs as a topic has received international recognition, as it has been placed among the top 100 universities in the world for its research contribution to three of the SDGs (namely SDG 4: Quality education; SDG9: Industry, innovation and infrastructure, and SDG 16: Peace, justice and strong institutions) and among the top 200 for SDG 17 (Partnerships for the Goals) and SDG 3 (Ensure healthy lives and promote well-being for all at all ages). Fourthly, SA1 hosts the South African SDG Hub that is developing a system for tracking research progress towards the SDGs. Such relationships develop new research capacity and focus investment on research development for innovation relevant to the sustainable development of Africa. With the support of the national Department of Science and Innovation, the South African SDG Hub collects, classifies, and disseminates publicly available peer-reviewed research from South Africa that contributes to any of the topics covered by the 169 targets of the Sustainable Goals (SA1-DOC-2). Lastly, South African HEI researchers have received numerous accolades for their research contributions to the SDGs.

The insertion of ESD in the South African research context is systematically planned and aligned with the SDGs, from which Brazilian HEIs can learn. It is important to note that HEIs employ research as a tool to not only respond to societal challenges but also to strengthen their international profiles by increasingly addressing society's need for new knowledge through research. As research-intensive institutions, South African HEIs concentrate on problems of national and regional concern in order to maximise local impact while enhancing their academic stature and visibility in a highly competitive international world (SA1-DOC-1). Meanwhile, scientific research of BR4 is commercialised and contributes to the economic development and well-being of citizens in the communities that host them (BR4-DOC-1). In order to improve their research capacity and improve their international research profile, BR2 recommends that Brazilian HEIs (a) increase the number of research projects linked to the SDGs; (b) increase the number of research partnerships with international institutions; and (c) introduce funding criteria that favour interdisciplinary research and innovation (BR2-DOC-4).

4.4.2.4 Pedagogical approaches that nurture sustainability-literate graduates

Pressure is placed upon the 21st-century HEI to address societal challenges, including sustainability, through their core activities (teaching, research, and extension activities). This pressure stems from the reality that the world for which students are being prepared is constantly changing (BR2-DOC-1). Consequently, Thomas (2020:899) recommends the use of

local and global content that would develop a comparative perspective when teaching towards ESD. Exposing students to local and global environments has the potential to provide them with a better understanding of their local environment and the role they play in the global ecosystem (Thomas, 2020:899; Zermeno & De la Garza, 2020:347). However, knowledge about SD alone is not enough to develop graduates that possess the competencies and sense of agency to catalyse change; adopting sound pedagogical approaches and transformative teaching methods is equally important (BR7-DOC-1; SA2-DOC-1). There is a concern that many students who enrol in HEIs are unsuccessful in completing their studies. In the context of South Africa, employing effective pedagogical approaches and socially just ways of dealing with the underperformance of students is imperative (SA3-DOC-3).

The following paragraphs elaborate on the extent to which Brazilian and South African HEIs incorporate pedagogical approaches identified by the sampled documents (JA-DOC-4; JA-DOC-12; JA-DOC-13) and scholarly literature that have the potential to develop sustainability-literate graduates (Brodowski, 2017; Daniels & Niemczyk, 2021; Jodoin, 2020; Lu & Zhang, 2013, 2018; Thomas, 2020). The findings are structured into six points of discussion: (a) the extent to which the HEIs under study nurture SD competencies; (b) the use of technology in the classroom of Brazilian and South African HEIs; (c) the employment of student-centred approaches in the classroom; (d) the development of globally competent citizens; (e) the provision of opportunities for a lifelong learning; and (f) real-life problem-solving.

The most important SD competencies required by graduates are methods to cope with uncertainty, complexity, and ambiguity. The aforesaid would require the acquisition of skills such as holistic thinking, effective communication, teamwork, and thinking in a manner that is critical, interdisciplinary, innovate, and reflective (JA-DOC-12). In this regard, BR4 strives to cultivate students that possess critical, creative and innovative thinking competencies as well as the ability to adapt and communicate through interdisciplinary dialogue (BR4-DOC-2). Furthermore, attitudes and values such as humanistic values, equity, ethics, respect and human dignity are developed by half of the Brazilian HEIs sampled for this study (BR2-DOC-2; BR4-DOC-1; BR4-DOC-2; BR5-DOC-1; BR7-DOC-1). In the case of South Africa, the Department of Education encourages a curriculum and teaching pedagogies that evoke critical thought, reason, the capacity to question, respect for different perspectives, and expression of views (JA-DOC-3). Thus, it is no surprise to note that SA2 and SA5 have an exemplary reputation for utilising teaching pedagogies that promote critical and creative thinking citizens capable of acting towards social justice and innovation. SA2 and SA5 claim that the best strategy to develop critical thinking competencies is to expose their students to the ideas of world-class academics and international collaborations. Engaging students with society and exposing them to the world

of work has the potential to improve their moral consciousness and to enhance their knowledge that can be utilised for the advancement of society (SA2-DOC-3; SA5-DOC-3). The OECD recommends that HEIs develop graduate attributes such as complexity synthesis, digital literacy, communication, collaboration, problem-solving, critical thinking, empathy, and ethical reasoning. These competencies are attributes that SA4 and SA5 strive to instil in their students and will ensure that students are prepared to respond to 21st-century trends such as sustainability (SA4-DOC-2; SA5-DOC-3). In the case of SA3, academics are working towards the goal of providing holistic education that encourages critical enquiry and understanding of the role they play in addressing social justice issues, and the skills required to compete in a globalised workplace (SA3-DOC-1).

Changes within the social, economic and environmental realms of sustainability are dynamic and constantly subjected to change. Consequently, teaching at HEIs needs to adapt to the dynamic nature of sustainability. One notable method of adapting is to utilise technology to expose students to current information through data, conferences, videos, and live chats with experts across the globe (JA-DOC-13; Lu & Zhang, 2013:57). To develop sustainability-related competencies, South African HEIs are incorporating new technologies into the classroom to embrace collaborative learning models, which facilitate a change in the relationship between students and lecturers in the learning process (SA4-DOC-2). An information communication technology (ICT) skills development programme rolled out by the division Educational Information and Engineering Technology of the School of Education has encouraged the incorporation of technology into the teaching of thousands of South African educators. The goal of the programme is to equip educators with digital pedagogies that will lead to innovative, 21st-century teaching (SA5-DOC-2). Similarly, through classroom renewal projects, SA3 has made great progress in transforming their classrooms with high standard physical infrastructure and teaching technologies. Furthermore, SA3 is aware that the implementation of technological infrastructure is important; however, the key focus is on how technology can enable transformative teaching and learning approaches. In short, technology is a driver for pedagogy, as opposed to pedagogy being a driver for technology. It is important to note that incorporating technology does not mean that it levels the playing field in terms of accessibility or pedagogical approach. It is encouraging to note that SA3 carries cognisance of the fact that digitisation can amplify educational inequality, especially for students from backgrounds where digital technology is not familiar or affordable (SA3-DOC-3).

As will be elaborated on in detail in § 5.5, incorporating technology into each lesson should be coupled with student-centred learning. Brodowski (2017:843) and Jodoin (2020:780) recommend that student-centred approaches be utilised in each lesson. However, scholarly

literature reports that both educators and students are not accustomed to transformative teaching methods and often feel comfortable with traditional approaches (Lu & Zhang, 2013:54; Thomas, 2020:900). In addition, educators are not always comfortable with relinquishing their positions of power in the classroom to facilitate student-centred learning. Therefore, it is worth noting that academics at SA4 employ a student-centred approach to teaching where learning is viewed as a process that requires partnership. In a student-centred approach, teaching activities facilitate knowledge-building and actively engage students in their own learning (SA4-DOC-1). Student-centred teaching does not only focus on the provision of facilities and infrastructure that are sensitive to student needs but also on the use of pedagogies that respond appropriately to the learning needs of all students (SA5-DOC-1). Furthermore, SA4 employs transformative teaching methodologies that cultivate the development of problem-solvers capable of utilising sustainable technologies (SA4-DOC-4). SA4 believes that an emphasis should be placed on how students learn, as opposed to what they are learning. An educator employed with SA2 moved away from a linear model of defined teacher–learner roles to one of transformative, shared responsibilities. Through student-centred learning, the educator challenges the idea of power and control in the classroom. The students in class succeed through student cooperation and collaboration, with individual students gradually taking responsibility for their own learning. The educator promotes their involvement in setting the direction and content of the module and believes that learning should have personal meaning for it to be memorable. SA2 reported that the feedback of students on this type of teaching is overwhelmingly positive (SA2-DOC-1). In the same sense, student-centred approaches should be infused with real-life, sustainability-related critical thinking, and problem-solving (Brodowski, 2017:843; Jodoin, 2020:780). BR2 utilises community engagement programmes to provide a unique academic environment for their students to learn from real-life community problems (BR2-DOC-1). Collaborative learning provides the basis for any HEI to be a learning organisation characterised by a shared vision and teamwork skills which are imperative for the attainment of global competencies (SA4-DOC-2).

Daniels and Niemczyk (2021) report that utilising teaching approaches that nurture globally competent citizens have the potential to develop graduates who can critically analyse the link between local and global sustainability-related issues. The Asia Society Partnership for Global Learning conceptualises global competence as the possession of knowledge, skills, and a willingness to understand and act creatively on topics of global importance (BR2-DOC-1). HEIs play a critical role in training human resources, which makes the role of these institutions indispensable to development that leads to a sustainable world. In this context, it is essential to understand that teaching needs to enable students to be prepared to act in a globalised and highly complex world. HEIs afford their students opportunities to develop multicultural skills and

global competencies and encourage them to consider their role as daily pioneers of innovation and sustainability (BR2-DOC-1). However, equipping students with global competencies has been challenging for HEIs globally (BR2-DOC-1). Thus, it is promising to note that a South African HEI (SA2) designs its programmes in a manner that equips its students for the world of work and for global citizenship (SA2-DOC-1). Meanwhile, BR2 utilises teaching pedagogies and curriculum content that create favourable conditions for the development of globally competent citizens. More specifically, to develop global competencies, BR2 utilises transformative teaching pedagogies and strives to develop a curriculum that offers students a mix of contemporary experiences and global opportunities, taking into consideration internationalisation, sustainability, and employability.

The development of global competence and ESD competencies calls for a lifelong learning process (Kieu et al., 2016:853). For this reason, it is propitious to note that Brazilian HEIs utilise innovative pedagogical practices, as opposed to traditional methods (BR4-DOC-2; BR8-DOC-2; BR8-DOC-3). Meanwhile, South African HEIs note that lifelong learning is essential to succeed in the 21st-century workplace. SA5 has a reputation of offering a wide range of short courses that assist lifelong learners working for businesses, institutions, and government to acquire new or updated knowledge and skills in their specific areas of interest (SA5-DOC-3).

Concerning the nature of lifelong learning, Brodowski (2017:843), Jodoin (2020:780) and Rampasso et al. (2020:3) recommend that educators infuse teaching with real-life problem-solving, as it is at the heart of ESD. Real-life problem-solving cannot be achieved by limiting learning to the classroom – outdoor learning experiences are as valuable and can be interlinked with opportunities to improve environmental, social and economic conditions of society (Thomas, 2020:897). Outdoor learning – which Thomas (2020:898) calls place-based education – creates a link between the classroom and the local environment in a multidisciplinary nature. Through the analysis of their local environment, students have the potential to develop a better understanding of society along with their responsibility and opportunities for SD (Thomas, 2020:900). Exposing students to the outdoors increases the potential of HEIs nurturing sustainability-literate graduates (Thomas, 2020:900). An encouraging development is that the South African Department of Education encourages teaching approaches that incorporate problem-solving (JA-DOC-3). Zooming in on specific scenarios, between the years 2015 and 2016, SA2 had 2 081 students in 32 modules participating in service learning (SA2-DOC-3). For instance, SA2 offered first-year students a service-learning opportunity to experience life as a professional accountant. Students solved real-life business problems and were able to present their solutions to representatives from the firms in a way that simulated the boardroom and the working environment that they aspired to enter after graduation (SA2-DOC-3). Through outdoor

learning experiences, students also had the opportunity to learn the importance of using recycled materials in connection with the concept of social justice, which is linked to sustainability (SA2-DOC-3). BR2, BR7, and SA2 provide their students with the opportunity to solve-real life problems, investigate the world, recognise perspectives, and communicate ideas to diverse audiences as part of their quest to find solutions to current challenges humankind is facing (BR2-DOC-1; BR7-DOC-1; SA2-DOC-1).

The findings reveal that both Brazilian and South African HEIs employ transformative teaching methods that create favourable conditions for acquiring SD competencies. South Africa can learn from Brazil's commitment to developing globally competent citizens (BR2-DOC-1). On the other hand, Brazil can learn from South Africa's innovative service-learning opportunities that extend learning beyond the walls of the classroom in order to incorporate a real-life problem-solving dimension into teaching and learning (SA2-DOC-1; SA2-DOC-3).

4.4.3 Implementation of sustainable development in extension activities

Globalisation has affected the way nations are governed and is increasingly intertwining people and economies, thus making the 21st century a time of rapid, unpredictable changes (BR5-DOC-4). Global challenges such as climate change, the Covid-19 pandemic, and wealth in the hands of only a few citizens could permanently change the future of humankind (BR5-DOC-4). It is in this alarming context that pressure is placed upon HEIs to act by assuming a leading role in providing solutions and improving conditions within society (BR5-DOC-4; BR5-DOC-5; SA5-DOC-3). Brazilian and South African HEIs have employed SD in extension activities as a method to nurture graduates who make a meaningful contribution to society in these highly uncertain and unpredictable times (SA5-DOC-3).

The respected position HEIs have come to assume in society has created the need for increased interaction with their host community. Through the creation and dissemination of knowledge, HEIs are expected to uplift their immediate communities (JA-DOC-6). SD in extension activities is academic actions aiming to strengthen relationships with sectors of society (BR5-DOC-4). Community engagement entails civic responsibility and citizenship, which links the research and teaching skills of staff and students to the specific needs of a given host community. SD in extension activities employs scientific knowledge to meet the expectations and interests of society. In the process, students, staff, and citizens learn from their interactions, thus making SD in extension activities mutually beneficial in the following ways (BR5-DOC-4; SA1-DOC-1). First, student life and the attributes developed while students are at university are enriched through their service and engagement (SA1-DOC-1). Second, the benefits of research

can be expanded beyond the campus in the form of SD in extension activities (BR2-DOC-1). Third, SD in extension activities provides students and academics with the unique opportunity to learn from local challenges and to acquire knowledge through practical education and real-life contexts (BR2-DOC-1).

4.4.3.1 Community-engagement initiatives that improve conditions of society

Brazilian and South African HEIs are aware that they have a responsibility to utilise their resources, research, and knowledge to improve the communities that host them (BR2-DOC-4; SA2-DOC-2; SA2-DOC-3; SA1-DOC-1). As is evident, SD in extension activities appears to be well-structured and common practice at the sampled South African and Brazilian HEIs (JA-DOC-2). In the two contexts under investigation, five activities reveal the commitment of HEIs to utilise their research and resources to better the communities that host them.

Firstly, teaching, research, and extension activities form a tripod of interconnected core activities (BR4-DOC-1). Extension activities are viewed as inseparable from teaching and research, especially in the context of Brazil (BR2-DOC-1; BR2-DOC-4; BR4-DOC-2; BR4-DOC-1; BR5-DOC-1; BR5-DOC-4; BR6-DOC-2; BR7-DOC-1; BR8-DOC-2; SA1-DOC-1; SA5-DOC-1). Brazilian HEIs structure their extension activities in a manner that enables responses to local and global societal challenges (BR2-DOC-4; BR4-DOC-2; BR5-DOC-1).

Secondly, Brazilian and South African HEIs are expanding SD in their extension activities by involving all staff, students, and faculties in community outreach programmes (BR4-DOC-1; BR5-DOC-1; BR8-DOC-2; SA1-DOC-1; SA3-DOC-1). For example, BR6 utilised an extension information system which records statistics from community engagement projects. In 2017, engagement with the community totalled 2 390 extension actions that involved 1 872 educators and approximately 4 000 students. Extension actions are currently developed in all academic units of BR6, encompassing the eight thematic areas (health, education, work, environment, communication, human rights and justice, production technology, and culture), involving approximately 1 500 teachers (BR6-DOC-2). In the case of BR8, 49 research projects and 73 extension activities were carried out in 2020, which involved 69 professors (BR8-DOC-2). BR4 has been characterised for its strong links with society through outreach activities, especially in the field of health. Its large secondary- and tertiary-care hospital units located on and off campus enable the HEI to serve a population of five million people (BR4-DOC-1). Extension actions in Brazilian HEIs have increased in recent years. However, extension activities linked to sustainability are mainly environmental in nature (BR5-DOC-1; BR2-DOC-4; BR8-DOC-1). As is evident, the objective of BR8 is to expand environmental sustainability projects and actions

(BR8-DOC-1). The social realm is not neglected in the case of BR5, as this institution's health faculties aim to improve nutrition and the quality of life in the communities that host them. For example, informing citizens about the correct use of medicines (BR5-DOC-1). Another HEI (BR6) has a goal to increase undergraduate student involvement in extension activities (BR6-DOC-1). Through community engagement, BR2 connects researchers and students with local leaders, lawmakers, families, health professionals, and communities to effectively address relevant needs of people in both urban and rural areas of the country (BR2-DOC-1).

Thirdly, despite the context of the new coronavirus pandemic, SD in extension activities in Brazilian and South African HEIs have not lost momentum (BR4-DOC-2; BR5-DOC-1; BR8-DOC-2; SA3-DOC-2). The medical department of BR8 has assisted in the country's response to the virus by administering rapid Covid-19 tests (BR8-DOC-2). BR4 has contributed by providing therapy to citizens during the pandemic (BR5-DOC-1). Through extension activities, BR4 strives to achieve a more equitable social reality to solve problems that impact society and the planet during and after the pandemic. Similarly, a forensic scientist employed with SA3 travelled all over the Western Cape during lockdown, volunteering at funeral homes, churches, and hospitals. This form of community engagement was imperative, as Covid-19 infection risk does not disappear immediately after the death of those who succumb to it; uninformed family members and professionals are left vulnerable to contracting the disease. The extension activity provided training sessions to a total of 7 000 citizens (SA3-DOC-2).

Fourthly, Brazilian HEIs have a responsibility to engage in outreach activities, as legislation makes it mandatory for these institutions to do so (BR5-DOC-1; BR6-DOC-2). As is evident, the National Education Plan states that extension activities must make up at least 10% of the total student curricular workload of undergraduate courses, which should be part of the courses' curriculum (BR2-DOC-4). Students receive credits for participating in extension activities, which is one opportunity HEIs can utilise to get students involved in sustainability-related programmes (BR2-DOC-4; BR6-DOC-2).

Lastly, Brazilian and South African HEIs ensure that SD in extension activities is aligned with the UN SDGs. It is important to consider that local demands can also extend to global challenges, as underscored by the SDGs (BR2-DOC-2). BR2 utilises the SDGs as criteria for defining problems to be addressed through university extension projects. In the case of South Africa, an HEI (SA6) has in place a community engagement and outreach policy which guides its extension activities (JA-DOC-7). The Department of Environmental Sciences at the HEI is involved in a project developing a food garden. Staff, students, and community members are invited to educational workshops on nutrition and how to cultivate plants, which resonates with

SDG 2 (zero hunger), SDG 4 (quality education), and SDG 11 (sustainable cities and communities). An additional SD extension project aligned with the SDGs involved the installation of 13 household biogas digesters that provide energy for cooking. This particular extension project took place in an impoverished, isolated rural farming community consisting mostly of subsistence farmers. The project was meant to promote the use of a renewable source of energy (SDG 7). Users were educated (SDG 4) about renewable energy and informed as to why opting for biogas energy was more sustainable than cutting down trees for wood, which addresses climate action (SDG 13) and reduces deforestation. In addition, the same rural community received sustainability lessons on use of locally available resources such as cow dung for the biodigester (SDG 4: quality education). The by-product, digestate slurry, is used by the community as organic manure, which, in turn, can assist in improving soil fertility and leads to improved levels of food security (SDG 2). Because of improved food security, surplus food may be produced which can be sold at local markets. Thus, providing an income for families and reducing poverty resonates with SDG 1 (JA-DOC-7).

Extension activities at the sampled Brazilian and South African HEIs are well implemented and aligned with ESD. South Africa can learn from the inseparable link between extension activities, teaching and research in the context of Brazil (BR2-DOC-1; BR2-DOC-4; BR4-DOC-2; BR4-DOC-1; BR5-DOC-1; BR5-DOC-4; BR6-DOC-2; BR7-DOC-1; BR8-DOC-2). Brazilian HEIs should strive to replicate South Africa's exemplary commitment to the infusion of the 17 SDGs into university extension (JA-DOC-7).

4.4.4 Maximising the implementation of ESD

Maximising the implementation of ESD will first require the identification of challenges limiting implementation (JA-DOC-13). The challenges of ESD implementation are interrelated, thus one challenge gives rise to a new challenge (JA-DOC-1). Many challenges exist due to the holistic nature of SD as it is a concept that not only connects different areas of knowledge but articulates knowledge from distinctive disciplines (JA-DOC-8). This section discusses sustainability-related challenges experienced by Brazilian and South African HEIs. Global sustainability-related challenges have already been discussed in the literature review. The purpose of this section is to add to the body of scholarly literature by identifying additional challenges from the perspective of HEIs located in Brazil, South Africa, and HEIs globally. In addition, there is a scarcity of scholarly literature exploring the challenges and responses of Brazilian and South African HEIs when implementing ESD, which this section addresses. Attention is also paid to the common source of sustainability-related challenges and their interconnectedness.

4.4.4.1 Sustainability-related challenges within the institution

The following table builds on the body of scholarly literature presented in chapter 2 by uncovering ESD challenges within the institution, applicable to the two contexts under scrutiny.

Table 4.4: Challenges institutions face when implementing ESD in their institutions

ESD challenges in the institution	Description
Lack of holistic vision and integrated approaches to innovation and sustainability (Farinha et al., 2020; JA-DOC-1)	UNESCO recommended the use of a whole-institution approach, which consists of an integrated, holistic method. A holistic method includes declaring ESD a priority in policy and mandates, providing training to staff, promoting sustainability-related research and collaborative work between stakeholders, faculties, and institutions.
Poor interdisciplinary and transdisciplinary cooperation within HEIs (JA-DOC-4; JA-DOC-8; JA-DOC-9; JA-DOC-14)	Collaboration and interdisciplinary dialogue and practice are critical to sustainability because of the complexity and interdisciplinary nature of SD. Interdisciplinary and transdisciplinary approaches are necessary, as they will allow academics to overcome the boundaries of individual disciplines and articulate different perspectives through a holistic approach. There is the challenge of working interdisciplinary (working across disciplinary boundaries), as academics do not always understand one another's academic jargon, the different practices, and the distinct approaches to teaching and learning.
Lack of support towards sustainable initiatives from senior management (JA-DOC-1; JA-DOC-4; JA-DOC-13; JA-DOC-14)	A systematic, holistic institutional strategy towards sustainability insertion requires support from top management. The sustainability insertion in HEIs should be performed strategically by top management who should receive sustainability-related training. This barrier poses the greatest obstacles to SD in HEIs as it creates other challenges such as a lack of interest about sustainability issues on the part of the professionals who act in the management, a lack of structure, and environmental committees.
Academics work in isolation (Avila et al., 2017:1271; Brodowski, 2017:842; JA-DOC-1)	Poor inter- and transdisciplinary cooperation within HEIs leaves academics to work in isolation within their faculties and areas of specialisation. In addition, a lack of institutionalised sustainability programmes results in sustainability actions being isolated.
Lack of time and financial resources dedicated to sustainability (JA-DOC-1; JA-DOC-13; JA-DOC-14)	The lack of time and financial resources is a factor inhibiting academic staff engagement in ESD. Academic pressures, such as the research excellence, publishing, and gaining research

	grants, hinder staff engagement in ESD and in curriculum innovation.
A lack of institutional sustainability policies (JA-DOC-2)	Sustainability policies at universities are an important driver of ESD implementation, as SD policy improves the management of all resources. However, policy development and effective implementation of the policy will only be achieved with the support of top management. Top management should endorse policy and lead by example. However, educational leaders who fully understand the holistic nature of ESD are rare.
Lack of understanding, leads to poor implementation (JA-DOC-2; JA-DOC-14)	The increase in strategies and policy development is promising; however, policies and strategies do not always reflect the holistic nature of ESD. Instead, there is usually a focus on implementing environmentally friendly practices (carbon reduction and greening the campus).
Resistance to change (JA-DOC-2; JA-DOC-9; JA-DOC-13; JA-DOC-19)	The history of academic freedom and the tradition of criticism are common attributes at HEIs that usually resist change. This can be problematic, especially with senior academics who have attained influence and status in their respective institutions when they tend to oppose change.
A lack of academic freedom (JA-DOC-14)	Individual research interests and the academic freedom to teach and research can serve as enablers or barriers to the implementation of ESD. This will be dependent on the perceived relation of SD to their specific area of expertise, personal motivation, and the interest of academics. Not all staff members will welcome ESD, see it as a positive idea, agree with the ethical perspective and will be willing to incorporate it into their research and teaching. For academics to effectively engage in ESD, their academic freedom to teach and research in ESD topics should be respected.
Balanced focus on environmental, social and economic realms of sustainability (JA-DOC-4; JA-DOC-8)	Sustainable practices are likely to focus on the environmental dimension in the form of greening the campus instead of holistically addressing all dimensions of sustainability.

4.4.4.2 Sustainability-related challenges in the classroom

The following table builds on the scholarly literature presented in the literature review (chapter 2) by zooming in on ESD challenges lecturers may face in HEI classrooms.

Table 4.5: Challenges educators face in the classroom when implementing ESD

ESD-related challenges in the classroom	Description
Educators who infuse sustainability into their teaching and research are not rewarded (Avila et	Academics and educators who contribute to ESD by infusing their research and teaching with

al., 2017; JA-DOC-6; JA-DOC-14)	innovative methods are not commended for their efforts. Instead of being rewarded, managers of sustainable initiatives receive extra workloads and must complete SD tasks in addition to their normal duties.
Pedagogical approaches that develop habits and mindsets that enable citizens to live sustainably are not employed in the classroom (JA-DOC-1)	Not enough emphasis is dedicated to developing SD competencies and changing the attitudes of students. Instead, most HEIs tend to overemphasise adding content to courses.
A lack of updated teaching material (JA-DOC-4)	The lack of constant updates in teaching material is a challenge, as the nature of sustainability is ever-changing.
A lack of debates (JA-DOC-8)	The intensity of discussions in a course will determine the extent to which the different disciplines are integrated and the involvement of students in SD extension projects. An in-depth discussion about a wide variety of examples would outline how complex aspects of sustainability (such as social) can be evaluated, which would enrich the training of students. Discussions will extend beyond examples that present sustainability as an environmental issue.
Curriculum disregards sustainability-related knowledge (JA-DOC-8; JA-DOC-14)	An overcrowded curriculum and inflexible curriculum structures could potentially prevent academic staff from engaging in ESD. The current reality of teaching is that single lectures accommodate many students – the curriculum is narrow, and assessment-focused. Consequently, usually, there is no room in the curriculum to introduce new SD content, as sustainability is not part of the official portfolio of courses.
Lack of understanding of the term sustainability (JA-DOC-13; JA-DOC-14)	The term sustainability gives rise to numerous discussions and debates in a political and epistemological sense. Sustainability is vague and can mean almost anything. In addition, sustainability can be applied to almost any scenario. The term is used in combination and synonymously with other terms such as social sustainability, environmental sustainability, sustainable development, sustainable living, and sustainable future. Poor understanding and a lack of knowledge about the holistic nature of sustainability are some of the main challenges faced by academics in engaging with ESD in the classroom and research context. The interdisciplinary nature of the concept and the lack of an agreed-upon definition hinder engagement in ESD. The holistic and interdisciplinary nature gives rise to the misconception that sustainability is limited to the fields of environment and geography.

Academics view sustainability as imposed on them (JA-DOC-14).	Some academics view sustainability as being imposed on them and not linked to their respective disciplines. In addition, many academics do not see the link between ESD and pedagogical innovation. In this context, the existing pedagogical scholarly literature on ESD tends to disregard the everyday life of academics, which are not necessarily in line with the educational ideals and requirements of ESD.
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4.4.4.3 HEIs' response to sustainability-related challenges

During the literature review phase (chapter 2), it was noted that many challenges prevent the effective implementation of ESD in HEIs globally. In addition, the scholarly literature in chapter 2 revealed that responding to ESD challenges is an important part of maximising the implementation of ESD. However, recent scholarly literature does not explore how individual HEIs respond to challenges that arise when implementing ESD. To this end, the four tables that follow reveal the extent to which Brazilian and South African HEIs respond to ESD challenges within their institutions and classrooms. In doing so, Brazilian and South African HEIs and HEIs globally can utilise the successes and shortcomings of the HEIs under investigation as a starting point to maximise ESD challenges.

Table 4.6: Brazilian HEIs' response to challenges that arise when implementing ESD

ESD challenges within Brazilian HEIs	Brazilian HEIs' response to sustainability-related challenge
Lack of holistic vision and integrated approaches towards innovation and sustainability (Farinha et al., 2020; JA-DOC-1)	BR2 approaches sustainability as a multidimensional concept and employs a holistic view, evident in their strategic planning (BR2-DOC-4). BR2 noted that the world is changing rapidly, thus the institution acknowledges the need to be prepared and committed to adapt to trends of the 21st century, which will contribute significantly to Brazil's development. The internationalisation of the institution will help students and staff to recognise global trends such as sustainability and invest in them in order to achieve meaningful goals. As a strategy, an institution-wide approach will be employed to strengthen their capacity and internationalise teaching, research, and community engagement (BR2-DOC-1). There was a lack of participation on the part of the other Brazilian HEIs under study.

Poor interdisciplinary and transdisciplinary co-operation within HEIs (JA-DOC-4; JA-DOC-8; JA-DOC-9; JA-DOC-14)	Brazilian HEIs mention their desire to conduct core activities in a transdisciplinary and interdisciplinary fashion (BR4-DOC-2). It is clear that the Brazilian institutions under study were aware of the importance of developing specialists that were able to conduct research, extension and teaching from a diverse range of perspectives. In turn, this interdisciplinary and transdisciplinary approach has potential to provide solutions to complex challenges such as sustainability (BR2-DOC-1; BR4-DOC-1; BR4-DOC-1; BR4-DOC-2; BR5-DOC-1; BR5-DOC-4; BR6-DOC-2; BR7-DOC-1). The participation and co-operation from the other HEIs under study were encouraging.
Lack of support towards sustainable initiatives from senior management (JA-DOC-1; JA-DOC-4; JA-DOC-13; JA-DOC-14)	Managers of Brazilian HEIs, comprising the dean, vice-dean, chief of staff, university mayors, deans, general secretaries and directors of units directly linked to the rectory, attended a series of meetings that led to the publication of strategic plans and institutional development plans of Brazilian HEIs. The aforementioned publications contain sustainability-related planning and reporting as well as strategies, thus senior management from the majority of HEIs is involved in sustainability-related decisions (BR4-DOC-2; BR5-DOC-3; BR8-DOC-1; BR8-DOC-2). Further evidence of educational leaders supporting sustainable initiatives can be found in the case of BR5. The manager of the Environmental and Safety Department is a member of the rectory (senior official in an educational institution) and reports to the pro-rectory of administration. The department handles the management of information on social and environmental projects and actions aimed at sustainability. Furthermore, planning tools with clear objectives, responsibilities, actions, goals and deadlines are set to establish sustainable practices and rationalisation behind expenses. The planning considers environmental protection, social justice, and economic development (BR5-DOC-3). It is evident that senior management is supporting sustainable practices within Brazilian HEIs. However, a lack of understanding of the holistic nature of SD has resulted in poor implementation of ESD. Senior management of Brazilian HEIs should receive ESD-related training (Mula et al., 2017).
Multidisciplinary working groups, committees and offices allocated towards sustainability (Avila et al., 2017:1271; Farinha et al., 2020:481; JA-DOC-1)	The Brazilian HEIs under study have democratic, multidisciplinary projects and working groups that are in constant dialogue with society (BR2-DOC-1; BR2-DOC-4; BR5-DOC-1).

A lack of institutional sustainability policies (JA-DOC-2)	Sustainability policies are evident; however, policies focus on daily operational activities and encourage sustainable practices (saving electricity) instead of ESD (BR2-DOC-4; BR4-DOC-2; BR8-DOC-3). Examples of policies dedicated to SD are the Solid Waste Management Plan (BR5-DOC-1) and the Human rights policy (BR5-DOC-1; BR6-DOC-2; JA-DOC-2). ESD is not clearly specified and clearly articulated in policy due to the reality that there is a poor understanding of the holistic nature of SD.
Academics work in isolation (Avila et al., 2017:1271; Brodowski, 2017:842; JA-DOC-1)	Brazilian universities still have steps to take towards sustainability in terms of co-operation and collaboration, as academics and institutions often work in isolation. However, steps are taken to promote sustainability through collaborative local, regional or international events (JA-DOC-9).
Lack of understanding leads to poor implementation (JA-DOC-2; JA-DOC-14)	BR4 is the only Brazilian HEI that conceptualises what sustainability means in the context of their institution (BR4-DOC-1). Sustainability is not only poorly defined; the role of stakeholders (staff and students) towards sustainability is not clearly articulated. Poor understanding of the holistic and interdisciplinary nature of ESD is leading to its poor implementation in Brazil.
A lack of academic freedom (JA-DOC-14)	Academic freedom was on a list of top priorities stemming from a professional development workshop (BR4-DOC-1).
Balanced focus on environmental, social and economic realms of sustainability (JA-DOC-4; JA-DOC-8).	Although environmental sustainability receives special attention, so, too, do topics such as social justice and equity. It is important to note that although the environmental and social realms of sustainability are addressed adequately by HEIs, they are not addressed in a holistic, interconnected and interdisciplinary manner. Environmental, social and economic realms of sustainability are discussed in isolation (BR4-DOC-1; BR5-DOC-2; BR7-DOC-1; JA-DOC-1; JA-DOC-2; JA-DOC-8; JA-DOC-9).

Table 4.7: Brazilian HEIs' response to ESD challenges in the classroom

ESD challenges in Brazilian classrooms	Brazilian HEIs' response to sustainability-related challenges
Educators and students who infuse sustainability into their teaching and research are not rewarded (Avila et al., 2017; JA-DOC-6; JA-DOC-14)	Brazilian HEIs have an excellent response to the challenge of a lack of incentives as students receive course credits (10%) for participating in extension activities (BR5-DOC-1; BR5-DOC-4; BR6-DOC-2).

Pedagogical approaches that develop habits and mindsets that enable citizens to live sustainably are not being employed in the classroom (JA-DOC-1)	ESD requires lifelong learning, the nurturing of globally competent citizens and the use of transformative teaching pedagogies. The analysed documents reveal that the majority of the sampled HEIs are prioritising transformative teaching methods and lifelong learning (BR2-DOC-1; BR4-DOC-2; BR8-DOC-2; BR8-DOC-3). In the case of BR2, sustainability-literate graduates are developed by nurturing globally competent citizens and employing student-centred approaches infused with real-life, sustainability-related critical thinking and problem-solving (BR2-DOC-1). Simply learning about sustainability in the curriculum is not enough at BR4. The HEI strives to develop competencies such as the ability to think critically and utilising the acquired knowledge to be socially responsible in their daily lives (BR4-DOC-1).
A lack of updated teaching material and poor curriculum flexibility (JA-DOC-4)	A curriculum that is receptive and adaptive to the dynamic nature of sustainability is needed for the successful implementation of ESD, which is evident in the case of Brazil. Curricula flexibility is understood and practised in two HEIs (BR4 and BR6) in order to respond to the challenges and ever-changing nature of society and sustainability (BR4-DOC-2; BR6-DOC-2). BR2 is adapting to the dynamic nature of sustainability, as is evident by the modern curriculum being implemented. The curriculum is developed with the intent to personalise students' education and providing students with opportunities for a humanistic, democratic, interdisciplinary and transdisciplinary education that values differences and cultural diversity (BR2-DOC-1).
Curriculum disregards sustainability-related knowledge (JA-DOC-8; JA-DOC-14)	Two HEIs (BR5 and BR8) are committed to teaching local and global content in a curriculum that incorporates multiple economic, social and environmental perspectives and developing opportunities that promote ethical and responsible action in society (BR5-DOC-1; BR8-DOC-1). As is evident, the curriculum includes topics and initiatives related to affirmative action, diversity, human rights, inclusion and the environment (BR6-DOC-2). Brazilian HEIs (BR7 and BR8) has courses with sustainability as core topics. For instance, the Program of Studies and Propositions about the semiarid provides knowledge useful to the development of policies for the SD of the Semi-arid region (BR7-DOC-1). BR8 offers a master's degree covering sustainability in environmental management (BR8-DOC-1). It is clear that Brazilian HEIs incorporate sustainability-

	related content, as is evident in the curriculum (JA-DOC-2). However, ESD is poorly specified and does not contain enough interdisciplinary and holistic detail in the curriculum of Brazilian HEIs (JA-DOC-2).
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Table 4.8: South African HEIs' response to challenges that arise when implementing ESD

ESD challenges in South African HEIs	South African HEIs' response to sustainability-related challenges
Poor interdisciplinary and transdisciplinary co-operation within HEIs (JA-DOC-4; JA-DOC-8; JA-DOC-9; JA-DOC-14)	SA5 noted that there is a growing trend in higher education to incorporate interdisciplinary and transdisciplinary learning programmes (SA5-DOC-3). The majority of South African HEIs have responded to the dynamic economic, social and environmental changes by employing an interdisciplinary approach to research, dialogue and teaching (SA1-DOC-2; SA2-DOC-1; SA3-DOC-4; SA4-DOC-1; SA4-DOC-2). Furthermore, an HEI (SA1) employs transdisciplinary and interdisciplinary knowledge, dialogue and research to contribute to society in a manner that will promote the health and well-being of people and the planet (SA1-DOC-2). The use of interdisciplinary and transdisciplinary approaches has been made urgent due to the emergence of Covid-19. In addition, the pandemic is also serving as a catalyst for innovation and collaboration. Initially, the pandemic was viewed as the domain of politicians and health scientists; however, it became clear that the world is dealing with a humanitarian and economic crisis. Every discipline, field of study and sector of society has a role to play, which will require inter- and transdisciplinary dialogue. To this end, most South African HEIs have capitalised on the opportunity presented by Covid-19 to scale up their service role and employ an interdisciplinary and transdisciplinary approach to their core activities (SA3-DOC-1 SA3-DOC-2; SA4-DOC-1).
Lack of support for sustainable initiatives from senior management (JA-DOC-1; JA-DOC-4; JA-DOC-13; JA-DOC-14)	Top management of an HEI (SA6) is supportive in the establishment of an office specifically addressing, reporting and developing strategies to respond to the SDGs (JA-DOC-7). Furthermore, top management of a South African HEI (SA6) opened up opportunities for implementation of sustainability initiatives by signing the United Nations Global Compact. Furthermore, the principles of the United Nations Global Compact were incorporated into relevant core activities. At the same institution, a workshop was held to

	develop a strategy for corporate social responsibility. The workshop was supported by the vice chancellor of the HEI, which would explore economic, social and environmental issues (JA-DOC-7). Other South African HEIs can learn from the commitment and support from educational leaders governing SA6.
Multidisciplinary working groups, committees and offices allocated towards sustainability (Avila et al., 2017:1271; Farinha et al., 2020:481; JA-DOC-1)	SA5 is committed to building on their established track-record of multidisciplinary research groups (SA5-DOC-1). Furthermore, multidisciplinary research, teaching and discourse are encouraged in the majority of South African HEIs (SA2-DOC-1; SA5-DOC-1; SA3-DOC-2).
Academics work in isolation (Avila et al., 2017:1271; Brodowski, 2017:842; JA-DOC-1)	SA3 noted that academics working in isolation is problematic, as there too many individual initiatives deployed at the HEI with little to no direction (SA3-DOC-3). In the context of SA5, the HEI intends to be classified as an African intellectual powerhouse and responds to societal challenges such as sustainability. However, this will require the HEI to initiate policies that open up spaces for collaboration globally, locally, and within the institution. Thus, individual and isolated efforts of staff and students should be avoided (SA5-DOC-1).
Lack of government policies to encourage the implementation of ESD and sustainable practices on campus (JA-DOC-1)	The Constitution of South Africa provides the core values for all education policy. South Africa's commitment to transformation and SD (in policy) is evident in the constitutional values of South Africa, which reflect the vision for a sustainable society (JA-DOC-3). Furthermore, South African governmental SD policies are many and include: The National Environmental Management Act (No 107 of 1998) (RSA, 1998), the Mineral and Petroleum Resources Development Act (No 28 of 2002), the National Water Act (No 36 of 1998), the Broad-Based Black Economic Empowerment Code of Good practice (2007), as well as the National Development Plan. The aforementioned legislation is mainly concerned with bridging the levels of inequality experienced in the country as well as protecting the environment. Although this legislation promotes SD, it does not contain a guide that directs action towards the attainment of South Africa's SD aspirations (JA-DOC-6).
A lack of institutional sustainability policies and poor implementation of sustainability-related commitments and policies (Brodowski, (2017; Farinha et al., 2020; Grindsted, 2011; JA-DOC-2; Lu & Zhang, 2013; Lozano et al., 2013; Mula et al., 2017)	Currently, there is a lack of SD policies in the majority of the sampled South African HEIs. However, most institutions have environmental sustainability and sustainable environmental management policies in place. For instance, two South African HEIs (SA1 and SA6) have an

	Integrated Sustainability Management Policy or a Waste Management Policy. Meanwhile, other HEIs are putting sustainability policies in place (JA-DOC-7; SA1-DOC-1).
Lack of understanding leads to poor implementation (JA-DOC-2; JA-DOC-14)	Sustainability is clearly defined by SA1 and SA4 (SA1-DOC-1; SA4-DOC-1); however, there is a lack of participation on the part of other HEIs in the South African context. It is concerning that the role of stakeholders (staff and students) in sustainability is not clearly defined and articulated. Poor understanding of the holistic and interdisciplinary nature of sustainability is leading to its poor implementation in core activities and policy in the South African context.
A lack of academic freedom (JA-DOC-14)	One of the core values of SA1 and SA2 is treasuring and respecting academic freedom (SA1-DOC-1; SA2-DOC-3).
Balanced focus on environmental, social and economic realms of sustainability (JA-DOC-4; JA-DOC-8)	Like the case of Brazil, in South Africa, environmental sustainability receives special attention; so, too, do topics such as social justice and equity. However, it is important to note that although the environmental and social realms of sustainability are addressed adequately by the majority of HEIs, they are not addressed in a holistic, interconnected and interdisciplinary manner. These different realms of sustainability are discussed in isolation (SA2-DOC-1; SA2-DOC-3; SA3-DOC-3; SA4-DOC-1; SA4-DOC-2; SA5-DOC-4; JA-DOC-2).
Sustainability offices and working groups	A South African HEI (SA6) has established a Sustainable Development Working Group with the objective to monitor and co-ordinate the SD projects at the institution. The same institution has appointed a sustainability officer overseeing and reporting on SD objectives and projects. These actions reveal that strategy adoption has been extended into actual implementation of strategy. It is important to note that the SA6 is one of the few HEIs in South Africa that has developed such an implementation framework; thus, other South African HEIs can learn from the example set by this institution (JA-DOC-7). In addition, SA6 has established sustainability offices whose main mandate is to support the implementation of initiatives contributing to the SDGs. The core functions of individuals working in sustainability offices is policy formulation, consultation and giving feedback to relevant stakeholders. The establishment of sustainability offices has advanced the mere adoption of policy to implementation of policy as the sustainability

	office implements the institution's Sustainability Masterplan comprising the Environmental Sustainability Policy of 2012, the Energy and Carbon Policy of 2016, and the Waste Management Policy of 2017. Further job description specifications of employees working in the sustainability offices is to coordinate sustainability meetings, host sustainability awareness events, and encourage recycling and community-engagement projects (JA-DOC-7).
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Table 4.9: South African HEIs' response to ESD challenges in the classroom

ESD challenges in South African classrooms	South African HEIs' response to sustainability-related challenges
Pedagogical approaches that develop habits and mindsets that enable citizens to live sustainably are not employed in the classroom (JA-DOC-1).	The rise of technology for educational purposes has enabled South African HEIs to adapt to the dynamic nature of sustainability. SA5 has adapted to the changing context of education in the 21st century, with a greater focus on the development of transferrable skills such as critical and creative thinking as opposed to memorising information (SA5-DOC-3). Furthermore, countries worldwide are experiencing unprecedented challenges in socio-cultural, economic, environmental and technological realms. SA5 prepares their students by instilling new ways of thinking by not only focusing on well-established, discipline-based knowledge. Instead, curriculum content and competencies will equip graduates to navigate their own lives and to lead others through an uncertain global environment (SA5-DOC-3). Furthermore, lifelong learning, the nurturing of globally competent citizens, the use of transformative teaching pedagogies, real-life, sustainability-related critical thinking and problem-solving are utilised in the classrooms of South African HEIs (SA2-DOC-1; SA2-DOC-3; SA3-DOC-1; SA4-DOC-2; SA5-DOC-1; SA5-DOC-3).
A lack of updated teaching material and poor curriculum flexibility (JA-DOC-4)	Updating curriculum content and teaching materials is necessary in order to adapt to the dynamic nature of sustainability. SA5 ensures rigorous quality assurance of all academic programmes and courses. In addition, curriculum content is continuously renewed (SA5-DOC-3). Evidence of curriculum flexibility in South Africa is

	displayed by challenges in the form of political, economic, environmental and technological development, which has led to a rapid transformation in agriculture globally. SA4 is responding through curriculum renewal, promoting multidisciplinary research and teaching initiatives to drive innovation and establishing strategic partnerships with the aim of strengthening sustainability and increase societal impact (SA4-DOC-2).
A lack of professional development and teacher training is creating a shortage of adequately prepared educators and staff to teach towards ESD (Feinstein et al., 2013)	SA5 provides opportunities for lifelong learning through a variety of short courses to academics and other professionals. Furthermore, support is offered to individual staff in their professional growth, which includes providing assistance with developing teaching portfolios (SA5-DOC-3). Although efforts to professionally develop educators are promising in the context of South Africa, they are not linked to ESD professional development. In terms of teacher training and sustainability, efforts to improve ESD in teacher education have made satisfactory progress. It is also important to note that there is evidence of sound educational teaching practice, training and policy in South African HEIs. The concern is that not much has been done in terms of consistently incorporating ESD into South African teacher education (JA-DOC-11). As is evident from the Faculty of Education of SA1, there is not much focus on ESD and the development of sustainability-related skills (SA1-DOC-4).
Curriculum disregards sustainability-related knowledge (JA-DOC-8; JA-DOC-14)	Evidence of SD content was found in the curriculum of three faculties in SA4 (Faculty of Theology, Faculty of Engineering, and Faculty of Law). In the case of faculties of SA2, the Faculty of Art incorporates topics such as social justice and human rights perspectives into their curriculum (SA2-DOC-3). The Faculty of Engineering and Built Environment is introducing new programmes and is aligning graduate-level work to the UN's SDGs (SA2-DOC-3). It is clear that South African HEIs incorporate sustainability-related content in their curriculums (JA-DOC-2). However, the incorporation of SD content does not equate to ESD, as SD content is poorly specified and does not capture the holistic nature of SD (JA-DOC-2).

4.4.4.4 Maximising the implementation of ESD in HEIs

The literature review (chapter 2) provided several recommendations for how HEIs can capitalise on opportunities towards the improvement of ESD. This section builds on the literature review by making recommendations for maximising the implementation of ESD in Brazilian and South African HEIs.

This section provides recommendations for maximising ESD in HEIs as a whole, drawing on the documents purposively sampled for this study (JA-DOC-1; JA-DOC-2; JA-DOC-3; JA-DOC-8; JA-DOC-9; JA-DOC-12; JA-DOC-13; JA-DOC-14; JA-DOC-15; JA-DOC-16; JA-DOC-19). Special attention is paid to the role of educational leaders in supporting teacher training and professional development, revising policy, adopting a whole-institution approach, interdisciplinary research and curriculum requirements, and adopting sustainable daily practices. In addition, the role of quality assurance and external benchmarking agencies, such as global university ranking systems, is also explored. The discussion outlines seven strategies that could maximise the implementation of ESD.

The first strategy, and the one with the most potential of scaling up the implementation of ESD and ensuring longevity and improvement, is commitment and support from top management of HEIs (JA-DOC-8). In fact, as is evident in the documents, the establishment and evolution of an ESD ideology require long-term commitment, time and continuous support from educational leaders (JA-DOC-1). Thus, the development and adoption of an institutional strategy for SD needs to be supported by rectors, managers, and professors in order to sustain sustainability programmes and initiatives. The commitment and support of educational leaders to sustainability require articulation in strategic planning, the mission and vision statement and policies (JA-DOC-9). For educational leaders to offer support and commitment in areas of priority and to catalyse effective transformation would require the provision of ESD-related training for individuals in leadership positions (JA-DOC-16; JA-DOC-19). Furthermore, educational leaders need to be aware of academics that may have a personal interest and motivation to engage in ESD; however, their engagement may be hindered by factors such as lack of time and financial resources. There are calls for educational leaders to allocate time and resources to the designing of new courses and the reviewing of existing courses, which will afford academics the opportunity to engage in ESD without increasing their workloads. The designing of new courses necessitates that students be introduced to sustainability in a manner that is not imposed on them (JA-DOC-14).

Management has one of the most important roles to play in scaling up the implementation of ESD. However, the role of educators is also crucial, as recognised by UNESCO. The second

strategy is endorsed by UNESCO (through their Global Action Programme), which is to improve the ability of educators to reorient their teaching practice towards ESD through the provision of appropriate teacher training and professional development of staff (JA-DOC-15; JA-DOC-16). Professional development recognises that the need for lifelong learning, as change is a constant feature of the 21st century. Professional development learning opportunities can be provided through informal or formal methods of learning, such as training, mentoring, workshops, action-learning sets, workplace projects, and accreditation schemes (JA-DOC-16). As regards teacher training, scaling up the implementation of ESD at all levels of education (primary, secondary, and tertiary) will require ESD to be included in teacher training and during employment in the form of professional development (JA-DOC-16). To prepare teachers for the challenge of implementing ESD at all levels of education, HEIs and teacher training programmes should embrace pedagogies that foster the competencies that enable teachers to serve as competent change agents (JA-DOC-15). It is important to note that ESD is not well-established in the teacher training or professional programmes of most countries (including South Africa and Brazil) – in fact, it is often disregarded (JA-DOC-15). A good starting point to embrace ESD in teacher training and professional development programmes is to include content and discourse that revolve around the following ideas and strategies (JA-DOC-16):

- brainstorm strategies useful to applying new pedagogies in the context of different professional disciplines;
- debate the reorientation of assessment as a progress tool for students and what this would mean for learning objectives viewed through an ESD lens;
- collaborate and explore scholarly literature before discussing strategies to challenge power relationships in learning and teaching;
- create scenarios in which sustainability thinking and practice apply to different industries and professions;
- explore theory discussing strategies to achieve transformative, educational change in institutions.

Embracing ESD in professional development and teacher training programmes as well as throughout the core activities of HEIs should be articulated in policy, which accounts for a third recommended strategy. The purpose of sustainability policies is to encourage students to participate in SD dialogue, scholarly activities and initiatives (JA-DOC-13), which is required due to the vast size and population of HEIs. Thus, SD dialogue, scholarly activities and initiatives should be enforced (through policy), as it is challenging to promote awareness amongst so many staff and students (JA-DOC-1). It is important for educational leaders to not merely symbolically commit to ESD on paper; instead, policy should adopt a whole-institution approach

in which all actions and decisions stipulated on paper are displayed through actions (of staff, students, and educational leaders) towards transformation and the implementation of ESD (JA-DOC-3). A whole-institution approach is necessary to ensure that change towards sustainability is not isolated in one core activity of HEIs. A whole-university approach of ESD implementation embraces sustainability in research, curriculum, campus operations, extension activities, the mission and vision statement, policies, targets and objectives, the creation and implementation of educational strategies, and strategic planning and partnerships with stakeholders (JA-DOC-14). In short, the purpose of an institution-wide approach is to link the theory and principles of ESD being taught in the classroom with the principles of ESD being implemented in the HEI in a tangible manner. Accordingly, students will be able to make the connections between theory and practice and the relationship of their studies with the campus itself and the broader world (JA-DOC-19). Developing an institutional understanding about the topic of sustainability and related terms and including it in core activities are required before implementing a whole-institution approach. The successful implementation of ESD throughout the institution is dependent on the staff and managers' understanding of the holistic and interconnected nature of sustainability (JA-DOC-1; JA-DOC-2). The employment of a whole-institution approach has the potential to increase the number of sustainability actions within the HEI and the local community. In addition, a whole-institution approach can empower students to be the architects of solutions to local and global sustainability challenges (JA-DOC-19).

The fourth strategy refers to research, which receives special attention due to its potential to generate knowledge advancing the society. Consequently, the availability and accessibility of scientific databases are critical to facilitate the research process, specifically areas of research under the broad umbrella of sustainability (JA-DOC-9). Conducting research about ESD may be challenging, as academics and educational leaders are often overwhelmed by other duties. It is also unlikely that academics and educational leaders would adjust the scope of their research without pressure for change. For this reason, adding multi-, inter- or transdisciplinary research on ESD as a promotion criterion or as a criterion to attain research funding could serve as incentive to maximise the implementation of ESD in research (JA-DOC-14).

The fifth strategy is interdisciplinary and transdisciplinary approaches, which receives special attention, as it reveals the permanent complex relationships between economic, social and environmental realms of sustainability. HEIs should promote inter- and transdisciplinary collaboration, dialogue, thinking and action in their core activities and whole-institution approach in terms of their research, teaching and extension activities (JA-DOC-13). These approaches allow academics and students to engage with multiple perspectives and solutions (JA-DOC-9; JA-DOC-13). Academics who work on multi-, inter- and transdisciplinary projects often gather

expertise and knowledge from a variety of disciplines, fields and stakeholders to find practical solutions to real-life problems. HESD has not only gained importance in different fields of research but also in different areas of educational practice, thus making these approaches essential (JA-DOC-9). Approaches that consider perspectives and solutions from a variety of fields are needed in order to effectively respond to the many challenges imposed on HEIs by the holistic nature of sustainability. Cooperation among HEIs through international events such as conferences and workshops have been identified as conducive to sharing knowledge, learning, and establishing new research projects across diverse fields (JA-DOC-9).

The sixth strategy is to utilise existing quality assurance processes and external benchmarking of HEIs to make sustainability a curriculum and research requirement. The effectiveness of external agencies in encouraging compliance and implementation of sustainability strategies is grounded in the reality that HEIs receive funding for their commitment to sustainability strategies. In addition, there is a high possibility that by making ESD an explicitly stated and assessed outcome of the curriculum, student engagement would increase. If sustainability is not part of the curriculum or exams, students may choose to disregard it (JA-DOC-14). In addition to including sustainability quality assurance and external benchmarking rubrics, ESD should also be included in the criteria for determining quality and competitiveness. In this context, a national ranking incorporating sustainability as criterion has great potential to motivate HEIs to implement ESD. A university ranking system can serve as an instrument to measure the scope of ESD implementation, which will allow the progress to be benchmarked against and compared to other HEIs (JA-DOC-1).

The last strategy to maximise the implementation of ESD is to incorporate sustainability practices into daily campus operations of HEIs, which creates an opportunity for students' hands-on learning. To that end, daily campus operations and infrastructure (water-saving taps and energy-saving lightbulbs) should facilitate water efficiency (reducing consumption), energy efficiency (reducing energy consumption), waste management (recycling), and sustainability of buildings (JA-DOC-9). Understanding the financial and environmental benefits of saving water, energy, food, and effective waste management to 21st-century trends, such as climate change, can motivate educational leaders to commit to SD practices (JA-DOC-1).

4.4.4.5 Maximising ESD in the classroom

Although capitalising on opportunities to maximise the implementation of ESD in the HEI as a whole is imperative, attention also needs to be devoted to the classroom. It is recommended that academics, educators, and management of HEIs consider the following strategies to

maximise the implementation of ESD in the classroom context. Based on the sampled documents (JA-DOC-2; JA-DOC-3; JA-DOC-4; JA-DOC-8; JA-DOC-9; JA-DOC-12; JA-DOC-13; JA-DOC-14; JA-DOC-16; JA-DOC-17; JA-DOC-18; JA-DOC-19), four strategies towards maximising the implementation of ESD in the classroom emerged:

- i) Shift pedagogical approaches from teacher-centred methods and theoretical learning to student-centred approaches incorporating critical thinking and problem-solving;
- ii) Include inter-, multi- and transdisciplinary approaches, perspectives and knowledge in the learning process;
- iii) Cultivate sustainability-related knowledge, competencies, and values;
- iv) Foster a democratic learning process.

The most important prerequisite to maximising ESD in the classroom is the pedagogical competencies of educators. Although a necessary prerequisite to developing sustainability-related values and competencies, classroom learning should not be limited to merely conveying expert sustainability knowledge to students. Instead, it should be coupled with the acquisition of knowledge, skill values, and competencies to respond to the complexities and uncertainties of the future (JA-DOC-16). Considering the complex and holistic nature of SD, multiple pedagogical approaches are required, since single pedagogical approaches are often ineffective (JA-DOC-3). The effective integration of ESD into the classrooms of HEIs calls for a shift in traditional pedagogical approaches to innovative pedagogical methods that link theory and practice. More specifically, this would require a move away from teacher-centred approaches and theoretical learning towards (a) student-centred approaches, (b) critical thinking, and (c) problem-solving (JA-DOC-2; JA-DOC-3; JA-DOC-4; JA-DOC-8; JA-DOC-9; JA-DOC-12; JA-DOC-14; JA-DOC-16; JA-DOC-18; JA-DOC-19).

The employment of student-centred approaches will empower students to be co-constructors in the learning process (JA-DOC-8; JA-DOC-12). Student-centred approaches will require students and educators to commit to collaboration, openness, trust, patience, and will take time (JA-DOC-17; JA-DOC-12). Student-centred approaches do not only encourage participation; they also create space for deep transformative learning, which, in turn, creates a favourable platform for students to develop reflective skills, to enquire and break away from the status quo, as well as to question existing unsustainable practices and values (JA-DOC-3). Student-centred pedagogical approaches to SD should be coupled with critical reflection, action-orientated learning, critical reflective thinking, participatory approaches, inter- and transdisciplinary approaches, and systemic thinking (JA-DOC-4; JA-DOC-14; JA-DOC-16; JA-DOC-18). To ensure optimal effectiveness, changes at two interconnected levels of pedagogy should occur. The first change is in the classroom, which will require lecturers to incorporate transformative

educational practices such as critical thinking and problem-solving. The second change is embedded in the curriculum, as it should be flexible and orientated towards ESD (JA-DOC-16). Zooming in on the criterion for lecturers to evoke critical thinking is based on the reality that critical thinking has the potential to nurture a critical attitude towards the values of ESD. In addition, instilling in students the competency to think critically will promote confidence when confronting challenges that hinder transformation and sustainability. To this end, transformation and sustainability should be steered by pedagogical approaches that enable students to transform their current realities through critical thinking and real-life problem-solving (JA-DOC-2; JA-DOC-3; JA-DOC-4; JA-DOC-9; JA-DOC-12; JA-DOC-14). The incorporation of real-life problem-solving into teaching will require the simulation of real-life, local and global sustainability-related problems (JA-DOC-4; JA-DOC-8; JA-DOC-9; JA-DOC-12; JA-DOC-14; JA-DOC-19). One notable method of simulating real-life sustainability scenarios in teaching is to expand the setting of teaching beyond the classroom. Outdoor learning serves as an effective setting for the acquisition of sustainability-related knowledge, skills, and actions. Outdoor learning can occur in the form of extracurricular activities, excursions, and service learning. The knowledge, values, and competencies attained through the outdoor experiences should be linked with classroom theory in order to achieve praxis (JA-DOC-8). Extracurricular activities and service learning as transformative pedagogical approaches provide students with a space (a) to learn and understand the theory in which ESD is embedded and (b) to engage in actions that benefit society and the environment (JA-DOC-8).

Extracurricular activities and service learning expose students to a variety of sectors within society, facilitating inter-, multi- and transdisciplinary approaches to teaching and learning. These approaches are necessary due to the complex, interconnected nature of sustainability requiring complex competencies (JA-DOC-4; JA-DOC-9; JA-DOC-18; JA-DOC-19). It is also important to note that educators need to constantly cultivate sustainability knowledge, skills, and values, as SD is a lifelong learning process (JA-DOC-9; JA-DOC-18).

Furthermore, as regards the effective implementation of ESD in the classroom, the cultivation of sustainability-related (a) knowledge, (b) competencies and (c) values is imperative. Sustainability-related knowledge should include a wide range of topics and perspectives connected in a multi-, inter- and transdisciplinary manner. Topics should include, but not be limited to, economic development, educational improvement, equal health care, climate change, energy systems, biodiversity, social justice, and urbanisation. It is also important that students uncover the interconnections between the different dimensions of sustainability (environmental, development, social, economic, cultural) and the interconnectedness of sustainability-related knowledge (multi-, inter- and transdisciplinary). Uncovering the holistic and complex nature of

sustainability and the different sectors of society enhances capacity to think critically (JA-DOC-18). One notable method of incorporating expert sustainability-related knowledge into courses is to capitalise on technological advancements. Courses can rely on data, videos, and live seminars with global experts to acquire sustainability-related knowledge and become informed citizens (JA-DOC-13).

As stated earlier, knowledge about SD is not enough; students also need to develop appropriate competencies and values. It is important to note that prescribing a mandatory set of competencies required for SD is beyond the scope of this study. This is due to the reality that there are multiple definitions and perspectives about sustainability and competence in an educational context (JA-DOC-18). The following ESD competencies were identified in the analysed documents (JA-DOC-12; JA-DOC-18):

- Considering changes in the future, and thinking about potential alternative scenarios in order to adapt;
- Putting challenges and opportunities into context, taking into consideration the different dimensions, which include the physical dimension (local-global) and the temporal dimension (past, present and future);
- Innovating in times of uncertainty by using multi-, inter- and transdisciplinary strategies;
- Making decisions using critical thinking and problem-solving to question assumptions while maintaining an open mind and respect for different types of perspectives and cultures;
- Participate, plan, and implement strategies and decisions;
- Possessing the emotional intelligence to reflect, manage emotions, and feel empathy, sympathy and solidarity;
- Considering different knowledge sources and perspectives before making conclusions, decisions, and acting towards change.

At the heart of ESD are values because they serve as a driving force that will motivate citizens to lead more sustainable lives (JA-DOC-3). Values that should be promoted by ESD are respect, commitment, and empathy in the context of the environment, heritage, and society at large (JA-DOC-18). It is important to note that a focus on values in the educational process does not suggest an uncritical acceptance of sustainability values. Instead, the adoption of values should be examined, debated, and tested, which would lead to a process of critical engagement with key sustainability-related values. Engaging students, educators, and stakeholders to challenge the values that are in line and in contrast with the ESD agenda creates a platform for the transformation of values-on-paper into values-in-action. This

transformation will require students to internalise the values deemed necessary for transformation and sustainability. In turn, this could become a powerful driving force in the transformation of society towards sustainability. However, nurturing values-in-action through changing attitudes, values and behaviours is a challenging task and one that requires more than just knowledge dissemination (JA-DOC-2; JA-DOC-14). It is important to note that the internalisation of ESD values may not always transmit to transformation or sustainability. Optimal potential for transformation and sustainability occurs when critical thinking, problem-solving and values are nurtured in an integrated fashion (JA-DOC-3). An innovative teaching approach to instilling ethics and values is to provide students with the opportunity to partake in service learning, which enables them to learn and develop values through their active engagement in the local community. In addition to nurturing values required for SD, service learning has the potential to cultivate compassion, social skills, teamwork, and emotional intelligence (JA-DOC-4).

The social principles of sustainability are grounded in democratic practices of equity, participation, and collective decision-making. In addition, education plays a pivotal role in the transformation and sustainability of society. For these two reasons, ESD needs to be democratic in nature (JA-DOC-3; JA-DOC-18). Democratic education views the engagement and participation of all stakeholders on an equal footing; thus, it upholds the value and right of equality for all. The contribution of democratic education towards ESD is embedded in the platform it creates for the involvement of its stakeholders (staff, students, and managers) in collective decision-making about social transformation and sustainability (JA-DOC-3). Furthermore, the analysed documents identified four reasons as to why democratic education is aligned with ESD. Firstly, it assures social cohesion through sound ESD practices and community-based decision-making. Secondly, it assures the legitimacy of decisions and warrants that the agenda of transformation and sustainability are aligned with the needs of the community. Thirdly, democratic education gives a voice to previously silenced, marginalised and alternative voices. Lastly, it creates the space in which to challenge the unsustainable practices that could potentially maintain and advance unsustainability (JA-DOC-3).

4.5 Similarities and differences between Brazilian and South African HEIs

This study was comparative in nature; therefore, the state of one or more aspects (country or institution) was compared, using at least one common contextual condition (Piovani & Krawczyk, 2017:823). According to Mugo and Wolhuter (2013:3), knowing that differences and similarities exist between education systems is not enough; researchers need to take into consideration contextual conditions of countries and must uncover why differences and

similarities exist. For this study to be deemed comparative in nature, (a) a decline in state funding, (b) the emergence of Covid-19, and (c) policy was explored as common contextual conditions to uncover why differences and similarities exist. Brazilian and South African HEIs prioritise attracting funding through research excellence, internationalisation (Brazil), improving global rankings (South Africa), which, in turn, maximise the financial sustainability of their institutions. The reasons for these similarities and differences within the HEIs under study are due to the reality that state and external funding has declined. In addition, the emergence of Covid-19 has made the attainment of financial sustainability in Brazilian and South African HEIs as well as in larger society urgent. Feinstein et al. (2013) identified policy as a contextual condition or external determinant creating differences in the strategies Brazilian and South African HEIs employ to gain international recognition. In turn, this creates a difference in the way Brazilian and South African HEIs implement ESD. The differences in ESD implementation are evident in South African HEIs' focus on research excellence, while Brazilian HEIs prioritise SD in their extension activities. South Africa's sustainability aspirations are ambitious and are reflected in multiple legislation and policy documents, the most notable being the 1996 Constitution, which enshrines the right of all South Africans to an environment that is not harmful to their health and well-being and to the sustainable management of the environment for current and future generations (Feinstein et al., 2013). The same authors noted that the difference between South African and Brazilian policy is grounded in the reality that domestic policy is critical to understanding ESD in South Africa, while policy promoting SD in Brazil is based on international policies. Due to their international cooperation and close affiliation with international countries, Brazil employs common strategies and efforts to improve conditions in society (Feinstein et al., 2013). This explains the focus of Brazilian HEIs in internationalising their HEIs, as opposed to the approach of South African HEIs, which is to improve their current position in global university rankings.

The following table explores the commonalities between the two investigated contexts as regards their approach to research, extension activities, financial sustainability, and the development of globally competent citizens. In doing so, the similarities between Brazilian and South African HEIs under study are identified.

Table 4.10: Similarities between Brazilian and South African HEIs

Similarities between Brazilian and South African HEIs
HEIs do not mention the words "education for sustainable development" in the analysed documents.
Through partnership with institutions located in developed and developing countries, HEIs strengthen their research potential and capacity (BR5-DOC-1; BR7-DOC-2; SA4-DOC-2).
Research is to be beneficial to society on a national, continental and global scale, which is achieved through multidisciplinary, interdisciplinary and transdisciplinary research, leading to ground-breaking

innovations (BR4-DOC-1; BR5-DOC-1; BR6-DOC-2; BR7-DOC-1; SA1-DOC-2; SA3-DOC-4; SA4-DOC-1; SA4-DOC-2).
Topics such as sustainability (in all dimensions), human rights, social justice and gender equality are forerunning themes embedded in research conducted by the sampled Brazilian and South African HEIs (BR4-DOC-1; BR6-DOC-2; SA1-DOC-1; SA4-DOC-2; SA5-DOC-2).
Educational leaders deem the financial sustainability of HEIs to be of utmost importance (BR2-DOC-4; BR4-DOC-2; BR5-DOC-1; BR6-DOC-1; BR6-DOC-2; BR7-DOC-1; SA1-DOC-1; SA2-DOC-2; SA2-DOC-3; SA3-DOC-1; SA3-DOC-3; SA4-DOC-1; SA4-DOC-2; SA5-DOC-1).
Despite the emergence of the coronavirus pandemic, SD in extension activities in Brazilian and South African HEIs have not lost momentum (BR4-DOC-2; BR5-DOC-1; BR8-DOC-2; SA3-DOC-2)
A Brazilian HEI (BR2) focuses on developing globally competent citizens (BR2-DOC-1). Similarly, a South African HEI (SA2) focuses on developing global citizens (SA2-DOC-1).

The following table explores the difference in approach employed by Brazilian and South African HEIs in terms of improving their global rankings, attaining the 17 SDGs, and the nature of their research and SD in their extension activities. In turn, the table identifies the factors that distinguish the two contexts under investigation.

Table 4.11: Differences between Brazilian and South African HEIs

Differences between Brazilian and South African HEIs	
Brazil	South Africa
HEIs mention global rankings; however, they prioritise the internationalisation of their HEIs. It is evident that the strategy employed to internationalise is to improve the research capacity of HEIs (BR2-DOC-1; BR2-DOC-3; BR6-DOC-2).	HEIs hold improving their current position in global rankings in high regard. It is evident that the strategy employed to improve the position in current global rankings is to improve the research capacity of HEIs (SA1-DOC-1; SA2-DOC-2; SA3-DOC-2; SA4-DOC-1; SA3-DOC-4; SA4-DOC-2; SA5-DOC-1; SA5-DOC-2).
There are HEIs aligning their research with the SDGs; however, it is clear that it is not as thorough and systematic as South African HEIs.	A considerable amount of research projects is strictly aligned with the SDGs (JA-DOC-7; SA1-DOC-2; SA3-DOC-2).
SD in extension activities is prioritised, thorough, and systematically implemented. Extension activities are viewed as inseparable from teaching and research (BR2-DOC-1; BR2-DOC-4; BR4-DOC-2; BR4-DOC-1; BR5-DOC-1; BR5-DOC-4; BR6-DOC-2; BR7-DOC-1; BR8-DOC-2).	SD in extension activities is not as prioritised as research projects. In addition, extension activities are aligned with research and teaching; however, they are not as thorough and systematic when compared to Brazil. However, SD in extension activities is aligned with the SDGs (JA-DOC-7).

The following Chapter 5 discusses the emerging theory, recommendations are made to stakeholders, and conclusions are drawn.

CHAPTER 5: EMERGING THEORY, RECOMMENDATIONS AND CONCLUSION

5.1 Introduction

To reach the research purpose of this qualitative study, documents analysis, following grounded theory methodology, was undertaken. The two-folded research purpose was as follows: (a) to systematically examine relevant documents to explore the effectiveness of HEIs in South Africa and Brazil in implementing ESD; and (b) to make recommendations for how HEIs in both contexts can maximise the implementation of ESD. More specifically, the research questions were posed to address the following research objectives: (a) to determine the emphasis dedicated to SD in the mission and vision statements as well as in other strategic planning documents of HEIs; (b) to evaluate the alignment of the curriculum, research practices and learning practices at HEIs with the principles of sustainable development; (c) to evaluate the implementation of sustainable practices and SD in extension activities in education; and (d) to identify ways South African and Brazilian HEIs can maximise the implementation of ESD.

The next section provides a brief summary of each chapter (1–4). The limitations of the study are then discussed. Thereafter, the discussion focuses on emerging theory, recommendations to various stakeholders based on the research findings, and concluding thoughts.

5.2 Summary of chapters

In chapter 1, key concepts were clarified, the background and orientation to the study were presented, which included the research problem, the research questions and objectives, as well as the research methodology. The research problem emphasised the call of UNESCO for more research studies to explore ESD in the context of HEIs for two reasons. Firstly, research about sustainability has the potential to bring prosperity and improvements within society (Marques et al., 2018:54). Joyce Msuya (Acting Executive Director of the UN) stated that economic growth can almost be doubled by following green economic approaches (Department of Environmental Affairs, 2019). Secondly, O'Malley (2019) noted that none of the SDGs can be achieved without HEIs contributing by means of research, teaching and SD in their extension activities.

The literature review in chapter 2 addressed the topic of HESD in several countries, with special attention being paid to the contexts of South Africa and Brazil. To be clear and informative, the literature review elaborated on the importance of conceptualising sustainability-related terms to prevent confusion and misconceptions. Thereafter, HESD and the important role HEIs play in the attainment of SDG 4 – with special attention to the progress made towards the attainment of

SDG 4 in the contexts of South Africa and Brazil – were discussed. Furthermore, attention was paid to HESD in developing countries, highlighting the progress of South Africa and Brazil. The last part of this chapter highlights challenges and opportunities related to the effective implementation of ESD grounded in a global context.

In chapter 3, details about the overall research design and research approaches employed in this study were provided. The chapter thoroughly described the methods and procedures employed to collect data. In addition, the theoretical framework, trustworthiness of the study and ethical considerations were discussed.

5.3 Summary

Chapter 4 was dedicated to the data analysis and the research findings. Content analysis was employed as qualitative data analysis research tool to systematically analyse the purposefully selected documents. The document analysis process was thorough, as it was guided by the principles of grounded theory. Sixty documents were manually coded. Following the grounded theory coding process, 129 open codes emerged, which were then grouped into axial codes by examining the relationship between the concepts. As illustrated earlier (figure 4.2), the axial codes served as categories, which resulted in the emergence of 13 selective codes. The 13 selective codes became themes and served as headings in the findings section, which provided answers to the four research questions of this study.

The findings revealed that South African and Brazilian HEIs have made considerable progress towards the implementation of ESD in their mission and vision statements, research, and extension activities. However, for improved implementation, ESD should be better inserted into the curriculums and teaching practices of the HEIs under investigation. In addition, there is an urgent need to provide educators and student teachers with training on sustainability-related pedagogical knowledge and competencies. The findings led to the conclusion that the effective implementation of ESD would require a holistic approach by HEIs. This means that sustainability principles, knowledge, and actions are implemented in all academic activities and practices. Support from HEIs' leaders is imperative in this regard.

5.4 Limitations of the study and potential future research direction

During this study, two limitations were identified concerning the transferability of the findings. Firstly, the findings of this research study cannot be transferred to other South African and Brazilian HEIs, as the research was limited to only eight institutions in the two mentioned contexts. Other HEIs in South Africa and Brazil may take different measures to implement ESD in their curriculums, research, and extension activities. Secondly, considering the time

constraints as well as the limitations of gathering data in person due to Covid-19, an informed decision was made to limit data collection to publicly available documents. The employment of document analysis in conjunction with interviews would have maximised the richness and trustworthiness of this study.

As regards future research, there are three focus areas that, if explored, have high potential to improve the implementation of ESD in HEIs. Firstly, academics should explore strategies top management can employ to enhance the implementation of ESD. In doing so, recommendations should be made, specifying the nature and type of sustainability-related training educational leaders should receive. Secondly, through case study research, academics at their respective institutions can explore the extent to which Faculties of Education instil sustainability-related knowledge, competencies and values educating their students and making recommendations for improved practice. Lastly, research should explore how educators (in HEIs) can incorporate ESD in their pedagogical approaches and other academic activities.

5.5 Arriving at an emerging theory

As stated earlier, a grounded theory study differs from other qualitative research designs, since the purpose of such a study is to develop an emerging theory based on the findings of the research (Merriam, 1998). Merriam and Grenier (2019) refer to emerging substantive theory, which captures a process and how it changes over time. Furthermore, emerging substantive theory depicts a specific practice grounded in reality; consequently, the findings are relevant to that practice. In the case of this study, the findings provide the foundation for an emerging substantive theory instead of a formal grand theory, since substantive theory has not been verified on a broader range of practices (Niemczyk, 2010). The development of a substantive theory requires the identification of a core category. The core category can link other categories to one another and links the core category to other categories (Merriam & Grenier, 2019). The substantive theory of this study was reached through a systematic process of making connections between memo-writing, revisiting the raw data (original documents), and reflecting on open and axial codes. In addition, factors that enabled or hindered the interaction between the codes and final themes of this study were identified. Through the aforementioned process, compliance with sustainability mandates emerged as a core category. The 13 themes identified related to the core category, either as casual conditions, context, intervening actions and strategies, or consequences. While coding data, developing themes and writing up the research findings, the researcher noted that compliance with sustainability mandates had a strong relation to all the themes (see table 4.4). In addition, compliance with sustainability mandates connected the other themes to one another. For instance, the theme *inclusion of sustainability in mission and vision statement* is interconnected with the theme *sustainability-related research*

beneficial to society. The inclusion of sustainability in mission and vision statements of HEIs and the realisation thereof have resulted in HEIs conducting sustainability-related research that can improve conditions within society. More specifically, a strong relationship was identified between the core category (compliance with sustainability mandates) and the intervening actions and strategies: (a) sustainability-related challenges within institutions; (b) sustainability-related challenges in the classroom; (c) HEIs response to sustainability-related challenges; (d) maximising the implementation of ESD in the HEI; and (e) maximising ESD in the classroom. Compliance with sustainability mandates has influenced multiple changes in HEIs, of which three changes (also open codes) continue to appear in an interconnected fashion. Firstly, HEIs function based on a business model, having adopted business principles. Secondly, since HEIs function as businesses, these institutions pay attention to the benefits of being ranked highly globally and strive to progressively improve their position in global rankings. Lastly, HEIs strive to respond to local societal challenges through nurturing sustainability-related research and inserting SD into their extension activities. South African and Brazilian HEIs acknowledge that improving global rankings are important. However, students and citizens are assured that global rankings would not negatively influence HEIs' ability to respond to local and global sustainability-related challenges. If HEIs prioritise their goal to improve their global rankings position over responding to local sustainability-related challenges, HEIs may face criticism, and the integrity of South African and Brazilian HEIs would be questioned. It is clear that the HEIs under investigation respond to sustainability-related challenges and capitalise on opportunities in a manner that satisfy the criteria to attain funding and improve their global rankings. Consequently, South African and Brazilian HEIs balance their desire to achieve their business objectives (being ranked highly globally and attracting funding) while responding to local societal challenges by focusing on sustainability-related research and sustainable practices (saving water and electricity). In short, the emerging theory indicates that Brazilian and South African HEIs driven by business principles prioritise the financial sustainability and prestigious reputation of their institutions (i.e., global rankings and internationalisation). The HEIs under investigation comply with sustainability mandates and employ some sustainable practices to secure funds and improve their global standing. The actual implementation of ESD is not a priority.

5.6 Recommendations

The four sections in chapter 4 that provided responses to the research questions already included detailed recommendations for the enhancement of ESD in HEIs. The findings were drawn upon to make the following recommendations, tailored specifically for different education stakeholders.

5.6.1 Recommendations to HEI educational leaders

HEI educational leaders should consciously aim to foster sustainability-literate graduates within their institutions by clearly articulating (in strategic frameworks and mission and vision statements) what sustainability means to the institution and the role of staff and students in achieving it. Educational leaders should ensure the successful implementation of ESD in the form of continuous professional development for staff (including top management) and students. In addition, the implementation of sustainable practices should be complemented by developing sustainability-related competencies in all students from all faculties. The aforesaid may start the process of consciously developing sustainability-literate graduates and may require educational leaders to establish an institutional SD culture and serve as role models.

In addition to the above-mentioned recommendations, analysed documents indicated that top management of HEIs may support the implementation of ESD by considering the following strategies (JA-DOC-12):

- Evaluate how education and research at the HEI currently contribute to sustainability, and make changes according to the successes and shortfalls identified;
- Evaluate and revise strategies, institutional publications, research reports, strategic frameworks, and mission and vision statements to include the environmental, social, economic inter- and intra-generational elements of SD;
- Provide opportunities for lifelong learning, as SD is dynamic and evolves as the knowledge, skills and values of students evolve;
- Include sustainability as part of the criteria for research funding and the measuring of research excellence.

5.6.2 Recommendations to HEI teaching staff

The development of sustainability-related competencies is especially important for educators to have a sustainability mindset and to carry cognisance of sustainability-related principles. Consequently, HEIs should prioritise programmes that develop sustainability-related knowledge, competencies and values in Faculties of Education and beyond. Although Faculties of Education are important, ESD needs to be holistic and applied in all faculties. Thus, HEIs should continuously provide their teaching staff and support staff with ongoing professional support in developing their own ESD competence. In turn, this could transform teaching pedagogies that develop graduates with the potential to initiate transformation and take action towards a more just, sustainable society.

In addition, educators can employ any of the following strategies in a single lesson to promote the development of ESD-related competencies and values:

- Learners can learn about how institutions such as the UN were established and the role they play in the attainment of a sustainable society;
- Evaluate unbalanced power, inequality, and historical conflicts between countries and ethnic groups;
- Educate learners about why climate change occurs and how it affects multiple locations;
- Discuss different ways in which climate change can lead to social and economic ramifications, and uncover potential solutions;
- A community problem can be role-played in which learners are given the opportunity to engage with real-life challenges, decisions and responsibility. The community-based problem should encapsulate all dimensions of sustainability;
- Structure debates that enable a deep analysis of global and local environmental, social and economic issues;
- Allow opportunities for students to identify acts of SD displayed by their peers, community members, and institutions;
- Inform students about the 17 UN SDGs by displaying a poster on the classroom wall and providing vivid examples;
- Develop strategies that empower students to contribute to the attainment of the 17 UN SDGs in their daily lives.

5.6.3 Recommendations to academic researchers

Further exploration into the implementation of ESD in the South African and Brazilian contexts is needed. More specifically, research on the effectiveness of an individual HEI in implementing ESD should be conducted. An in-depth exploration of each faculty of a specific HEI could uncover the extent to which each faculty is effectively implementing ESD. Researchers could investigate ESD at their own institutions to identify the status and areas that require improvement. Other institutions (local and global) can also be examined to identify, through the comparative method, best practices to implement at their institutions and beyond. Furthermore, multi-, inter- and transdisciplinary research can be encouraged by incorporating aspects of SD into research designs.

5.6.4 Recommendations to global ranking systems

Global rankings are unlikely to disappear in the immediate future, and it is clear that global rankings encourage HEIs to take action to improve their standing. As is evident, the criteria used by global rankings have improved and increased action of South African and Brazilian

HEIs to implement sustainable practices and ESD. To this end, global rankings systems should expand their ranking criteria to include all dimensions of sustainability in the core activities (teaching, research, extension activities, and daily operations) of HEIs. It is important for global ranking criteria to support the implementation of ESD and not be limited to sustainable practices. This would require understanding and support from stakeholders who possess the power to affect decision-making in global ranking systems. Through ranking criteria, global ranking systems can employ the following strategies to assist with the promotion and expansion of effective implementation of ESD in HEIs:

- Encourage HEIs to incorporate the principles of sustainability in their mission and vision statements through developing additional ranking indicators;
- Promote compliance with and adoption of sustainability mandates, strategies, and charters;
- Display exemplary examples of HEIs ranked highly in terms of effectively implementing ESD, which can serve as examples to other institutions;
- Develop indicators to measure the contribution HEIs make to the fulfilment of the 17 SDG (Torabian, 2018).

5.7 Conclusion

ESD is essential to transform the value systems of citizens and reshape the way citizens think about and act on economic, societal and environmental challenges (UNESCO, 2014:8). If sustainability is to be implemented effectively in Brazilian and South African HEIs, more attention needs to be devoted to classroom teaching that equips students with the competencies to participate in the discourse on and action towards equal economic, environmental and social opportunities (Hensley, 2017:3). Based on the document analysis conducted in this research, it is concerning that HEIs do not mention the concept of “education for sustainable development”, even though they position themselves to contribute to SD in the form of research and extension activities. A further concern is that the curriculums of Brazilian and South African HEIs do not prioritise sustainability-related content – thus, they do not show clear commitment to developing sustainability-related competencies and values in students. Although sustainability-related content is neglected in the HEIs under study, these institutions employ sound pedagogical approaches (student-centred learning, real-life problem-solving, critical thinking) necessary for the development of sustainability-literate graduates in the classroom.

The implementation of ESD by South African and Brazilian HEIs is hindered by the reality that HEIs prioritise strengthening the financial sustainability of their institutions and achieving competitive advantage over nurturing sustainability-related competencies (JA-DOC-6).

Competitive advantage refers to conditions that create a superior position of an institution over its competitors (JA-DOC-6). Competitive advantage is critical to HEIs, as HEIs are business organisations and continue to innovate with an objective of attracting funding and the best staff and students (JA-DOC-10; JA-DOC-20). More specifically, HEIs achieve competitive advantage by improving their research capacity, which, in turn, improves their global rankings (JA-DOC-6).

The desire and, to a certain degree, the necessity to gain competitive advantage to attract funding was evident in the HEIs under investigation, as South African HEIs declare themselves research-intensive institutions. Research in the context of Brazil is used for commercial purposes (BR4-DOC-1; SA1-DOC-1; SA4-DOC-2; SA4-DOC-2; SA5-DOC-1; SA5-DOC-3). Furthermore, sustainability initiatives (in daily operations, teaching, research, and extension activities) cannot be discussed without mentioning how these initiatives can lead to financial sustainability (JA-DOC-6). The Fees Must Fall protests, a decline in state and external funding, and the emergence of Covid-19 as contextual conditions have made the attainment of financial sustainability in HEIs challenging and simultaneously imperative. Furthermore, to survive, innovate and ultimately thrive, HEIs must continue to attract students and staff with the desired levels of competence (JA-DOC-6). As was evident in the findings, HEIs aim to attract outstanding staff and students (SA4-DOC-1).

Although the aforementioned is a positive development, an overemphasis on research has resulted in fewer resources dedicated to developing sustainability-related competencies in curricular content of Brazilian and South African HEIs. It appears that SD initiatives within South African and Brazilian HEIs are based on the assumption that the implementation of sustainable practices and conducting sustainability-related research would enable HEIs to improve their financial sustainability and gain a competitive advantage (JA-DOC-6).

It is important to note that HEIs make several social contributions, including consistent progress in addressing environmental, social and economic societal challenges, as well as striving to reach global standards. As a response to inequality and societal challenges, South African and Brazilian HEIs are constantly improving enrolment rates, balancing demographic dynamics, internationalisation, and sustainability-related research outputs and postgraduate applications. The aforesaid is also linked to improving competitive advantage and financial sustainability, as they are used as criteria to rank universities. South African and Brazilian HEIs constantly refer back to their desire to improve their global rankings. However, Brazilian HEIs refer to their desire to be ranked highly – the internationalisation of institutions through high-impact research is mentioned more frequently than global rankings (BR2-DOC-1; BR2-DOC-3; BR6-DOC-2). To this end, HEIs' compliance with sustainability mandates and their goal of achieving social justice give the impression that it is a two-folded response to external pressures. On the one hand,

HEIs are expected to serve as examples to other institutions and citizens. Thus, to maintain their integrity and reputation, HEIs comply with sustainability mandates. On the other hand, HEIs are businesses, hence they cannot be compliant with sustainability requirements at the expense of their financial sustainability and their position in global rankings. Top HEIs attract top staff and top students, which enables them to remain top HEIs. Talented students lead to better results, which, in turn, allows HEIs to establish a prestigious reputation. Like business aims are focused on increasing productivity, HEIs aim to produce the best research outputs and graduates. In the process, however, the effective implementation of ESD is side-lined, as strategic decisions and resources are employed based on their contribution to financial sustainability and global university rankings.

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APPENDIX A: PURPOSEFULLY SELECTED DOCUMENTS

Details of documents purposefully selected for this research study

Document	Title of the document	Date of collection	Type of document
BR1-DOC-1	Sustainability Report	2018	Public record
BR2-DOC-1	Strategic plan 2018-2021	2018	Public record
BR2-DOC-2	Mission and vision statement	2021	Public record
BR2-DOC-3	Research strategy	2021	Public record
BR2-DOC-4	Institutional Development 2019-2028	2019	Public record
BR3-DOC-2	Mission and vision statements of faculties	2021	Public record
BR4-DOC-1	Magna Charter	2018	Public record
BR4-DOC-2	Strategic framework 2016-2020	2016	Public record
BR5-DOC-1	Institutional development plan 2021	2021	Public record
BR5-DOC-2	Sustainable management plan 2020 Volume I	2020	Public record
BR5-DOC-3	Institutional development plan Volume II	2021	Public record
BR5-DOC-4	Guide for circularization of extension activities in undergraduate courses	2017	Public record
BR5-DOC-5	Institutional development plan	2021	Public record
BR6-DOC-1	Institutional development plan	2021	Public record
BR6-DOC-2	Institutional Development Plan 2018-2023	2018	Public record
BR7-DOC-1	Institutional Development Plan	2010	Public record
BR7-DOC-2	Research strategy	2018	Public record
BR8-DOC-1	Institutional development plan	2018	Public record
BR8-DOC-2	Annual activity report	2021	Public record
BR8-DOC-3	Annual report	2021	Public record
JA-DOC-1	The environmental sustainability of Brazilian universities: barriers and pre-conditions	2015	Public record
JA-DOC-2	Sustainable development policies as pre-conditions and indicators of sustainability at universities	2018	Public record

JA-DOC-3	Education for sustainable development in South Africa: a model case scenario	2016	Public record
JA-DOC-4	Engineering education for sustainable development	2020	Public record
JA-DOC-5	How green is Brazilian accounting students perception	2019	Public record
JA-DOC-6	Promoting sustainable development implementation in higher education: Universities in South Africa	2017	Public record
JA-DOC-7	Implementation of the SDGs at the University of South Africa	2019	Public record
JA-DOC-8	Some of the challenges in implementing ESD: perspectives from Brazilian HEI students	2019	Public record
JA-DOC-9	The importance of international conferences on sustainable development as higher education institutions strategy to promote sustainable development: a case study in Brazil	2017	Public record
JA-DOC-10	Ranking the performance of universities: the role of sustainability	2021	Public record
JA-DOC-11	A review of education for sustainable development and global citizenship education in teacher education	2017	Public record
JA-DOC-12	A decade of Finnish engineering ESD	2019	Public record
JA-DOC-13	A pilot study for ESD in the Romanian economic HE	2018	Public record
JA-DOC-14	Academic staff engagement in education for sustainable development	2015	Public record
JA-DOC-15	Becoming a competent teacher in education for sustainable development	2019	Public record
JA-DOC-16	Catalysing change in HE for SD	2017	Public record
JA-DOC-17	Competencies in ESD: emerging teaching and research strategies	2020	Public record
JA-DOC-18	Competencies in ESD: exploring the student teachers views	2015	Public record
JA-DOC-19	Promoting sustainable development in HEIs: top down, bottom up or neither	2020	Public record
JA-DOC-20	(Does sustainability reporting promote university rankings: Australian and New Zealand evidence)	2020	Public record
SA1-DOC-1	University Vision for 2040	2011	Public record
SA1-DOC-2	Research report	2019	Public record
SA1-DOC-3	Teaching and learning review	2020	Public record
SA1-DOC-4	Teaching and learning review	2014	Public record

SA2-DOC-1	Strategic plan 2025	2011	Public record
SA2-DOC-2	Strategic objectives 2014-2025	2014	Public record
SA2-DOC-3	Teaching and learning report	2016	Public record
SA2-DOC-4	Annual report	2020	Public record
SA3-DOC-1	Strategic planning framework 2016–2020	2016	Public record
SA3-DOC-2	Research report 2019-2020	2019	Public record
SA3-DOC-3	UCT teaching and learning strategy 2017	2017	Public record
SA3-DOC-4	University of Cape Town research report	2018	Public record
SA4-DOC-1	Vision 2040 and strategic framework 2019-2024	2019	Public record
SA4-DOC-2	Annual integrated report	2019	Public record
SA4-DOC-3	Stellenbosch teaching and learning strategy	2017	Public record
SA4-DOC-4	Research report	2019	Public record
SA5-DOC-1	Strategic framework 2010-2022	2010	Public record
SA5-DOC-2	Research report	2019	Public record
SA5-DOC-3	Learning and teaching plan	2020	Public record
SA5-DOC-4	Annual report	2020	Public record

APPENDIX B: ETHICS CERTIFICATE



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Senate Committee for Research Ethics
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ETHICS APPROVAL LETTER OF STUDY

Based on approval by the **Faculty of Education Research Ethics Committee (EduREC)** on 29 April 2021, this committee hereby **approves** your study as indicated below. This implies that the North-West University Senate Committee for Research Ethics (NWU-SCRE) grants its permission that, provided the special conditions specified below are met and pending any other authorisation that may be necessary, the study may be initiated, using the ethics number below.

Study title: Higher education for sustainable development in South Africa and Brazil: A comparative study

Study Leader/Supervisor (Principal Investigator)/Researcher: Prof EK Niemczyk

Student / Team: CE Daniels (MEd student – 32415494), Dr ZL de Beer

Ethics number:

N	W	U	-	0	1	2	7	6	-	2	0	-	A	2
Institution			Study Number					Year			Status			

Status: S = Submission; R = Re-Submission; P = Provisional Authorisation; A = Authorisation

Application Type: Project

Commencement date: 29 April 2021

Risk:

No risk

Expiry date: 29 April 2022

Approval of the study is initially provided for a year, after which continuation of the study is dependent on receipt and review of the annual (or as otherwise stipulated) monitoring report and the concomitant issuing of a letter of continuation.

Special in process conditions of the research for approval (if applicable):

General conditions:

While this ethics approval is subject to all declarations, undertakings and agreements incorporated and signed in the application form, the following general terms and conditions will apply:

- The study leader/supervisor/principal investigator/researcher must report in the prescribed format to the EduREC:
 - annually (or as otherwise requested) on the monitoring of the study, whereby a letter of continuation will be provided, and upon completion of the study; and
 - without any delay in case of any adverse event or incident (or any matter that interrupts sound ethical principles) during the course of the study.
- The approval applies strictly to the proposal as stipulated in the application form. Should any amendments to the proposal be deemed necessary during the course of the study, the study leader/researcher must apply for approval of these amendments at the EduREC, prior to implementation. Should there be any deviations from the study proposal without the necessary approval of such amendments, the ethics approval is immediately and automatically forfeited.
- Annually a number of studies may be randomly selected for an external audit.
- The date of approval indicates the first date that the study may be started.
- In the interest of ethical responsibility, the NWU-SCRE and EduREC reserves the right to:
 - request access to any information or data at any time during the course or after completion of the study;

APPENDIX C: PROOF OF EDITING

Dr. JACKIE DE VOS

Academic copy editor / Akademiese teksredakteur

BA (Psychology & Communication studies), BAHons (Psychology) (NWU)
MEd, PhD (Educational Psychology) (NWU)
BAHons (Translation) (UNISA)
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EDITING

11 March 2022

To whom it may concern

This letter serves to confirm that the following dissertation was edited:

Higher education for sustainable development in South Africa and Brazil: A comparative study

The onus is on the client(s) to work through the proposed track changes and to accept or reject proposed changes. Clients might amend/re-work or add to the content during and after the editing process which may introduce errors. Clients should make certain that all sources/references have been cited and that they are satisfied with the final manuscript before submitting.