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M Ed. by Coursework: Research Report

Study Topic: An investigation of the integration of environmental and sustainability content into the National Certificate Vocational (NCV) Primary Agriculture Level 3-4 curriculum in the South African TVET system.

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Date: 31st August 2020

DECLARATION

By submitting this Research Report in both electronic and hard copy formats, I affirm that the entire work contained therein is my own original work, that I am the sole writer thereof (save to the extent openly otherwise stated), that reproduction and publication thereof by the University of the Witwatersrand will not invade any third party rights and that I have not before in its entirety or in part submitted to achieve any qualification anywhere.



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Date: 31st August 2020

ABSTRACT

This study investigates the integration of environmental and sustainability content into Primary Agriculture Curriculum offered at Technical and Vocational Education and Training (TVET) colleges in South Africa. The investigation of the integration of this thematic area within Primary Agriculture is driven by the fact that the agriculture sector in South Africa remains a significant contributor to the country's economic growth. The sector plays a central role in the alleviation of poverty and food insecurity in rural areas. The South African National Development Plan demands that all levels of agricultural education and training programmes must be used to advance skills development in the agriculture sector. Globally, agriculture plays a significant role to humankind as reflected in its connection to no less than 11 out of 17 United Nations Sustainable Development Goals (SDGs). Since the adoption of SDGs in 2015, agriculture has become a common thread which holds the 17 SDGs together.

On the other hand, the agriculture sector faces innumerable sustainability challenges such as climate change, land degradation, declining water quality, unsustainable practices, competition over arable and land reform contestations. Agricultural activities are responsible for 13.5% of greenhouse gas emissions across the world. Whilst agricultural enterprises contribute to climate change, they remain enormously vulnerable to its effects. There is therefore a dire need across the globe for policy and academia to advance building skills for sustainable living.

With the United Nations (UN) adoption of sustainable development as a global framework for development, TVET colleges are favorably placed to build a sustainable world by preparing a work-force empowered with sustainability values and practices through vocational and technical qualifications. The TVET is the sphere of the education and training system that has a direct link to workplaces. However, work performance is not only dependent on building skills, but also knowledge and understanding that underpin work. In the world of today, sustainable development forms part of the new knowledge and understanding that should be incorporated into vocational education. TVET curricula can be used to create inspiring and creative learning environments by nurturing ethics, attitudes

and values compatible with environmental protection. The method to integrate sustainability skills into TVET curriculum should be carried out by infusing them into existing development of hard skills and soft skills. In conclusion, it is very important to emphasize that to address socio-economic and sustainability concerns, skills underpinned with sustainable development knowledge, values and ethics are needed. Hence, the rationale for this study to investigate integration of sustainable development into the Primary Agriculture Curriculum.

DEDICATION

I dedicate this Research Report to my supportive wife, Mrs Ndivhuwo Phyllis Dzhugudzha, and my three beautiful children, Mukhethwa, Mpho and Masase. Thank you so much for your unconditional love, patience, support and belief in me to complete and obtain this M Ed degree.

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LIST OF ACRONYMS

ASSAF	Academy of Science of South Africa
CEDEFOP	European Centre for the Development of Vocational Training
DEA	Department of Environmental Affairs
DHET	Department of Higher Education and Training
DoE	Department of Education
EEPI	Environmental Education Policy Initiative
FAO	Food and Agricultural Organization
FET	Further Education and Training
GDP	Gross Domestic Product
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
ILO	International Labour Organization
NCV	National Certificate Vocational
NDP	National Development Plan
NPC	National Planning Commission
NQF	National Qualifications Framework
PGCE	Post-Graduate Certificate in Education
PSET	White Paper on Post-Schooling Education and Training
SD	Sustainable Development
SDGs	Sustainable Development Goals
TVET	Technical and Vocational Education and Training
UN	United Nations
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNEVOC	International Project on Technical and Vocational Education
VET	Vocational Education and Training

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CHAPTER ONE: STUDY INTRODUCTION

1.1. Introduction

This study investigates the integration of environmental and sustainability content into the National Certificate Vocational (NCV) Primary Agriculture Curriculum level 3 to 4 offered at the Technical and Vocational Educational and Training (TVET) Colleges in South Africa. The Primary Agriculture Curriculum was developed to empower students to acquire knowledge, understanding, skills and competences needed for employment at an intermediate level within the agricultural sector. The qualification empowers trainees to enter a mixed farming situation as either employees or entrepreneurs (DoE, 2007). The Primary Agriculture qualification at TVET must contribute towards addressing unemployment by empowering youth with employable and entrepreneurship skills.

South Africa continues to suffer from serious socio-economic challenges such as unemployment and poverty. In a developing economy like South Africa, agriculture remains a crucial productive sector in addressing these socio-economic challenges. Agriculture can create more jobs per Rand invested than any other productive sector and remains central in the fight against poverty and food insecurity (ASSAF, 2017). Nevertheless, agriculture in South Africa still lacks capacity and skills to address these socio-economic challenges due to numerous sustainability challenges experienced in the sector such as climate change, land degradation, declining water quality, unsustainable practices, competition over arable land, land reform problems, etc. (ASSAF, 2017).

For agriculture to respond appropriately to socio-economic challenges, the sustainability concerns faced by the sector must be resolved first. Addressing sustainable development concerns includes resolution of complex issues of environmental deterioration, human development and poverty reduction (Pavlova, 2009). Therefore, capacity and skills development are needed to address these sustainability challenges. Hence, the purpose of this study is to examine integration of sustainable development into the Primary Agriculture qualification as one of the possible means to build the needed capacity and skills. The integration of sustainable development into agricultural training will nurture

awareness, skills, knowledge, attitudes, values leading to appreciation and commitment to conserve the quality of the ecological system upon which agricultural development depends (Kamis et al., 2017). Likewise, Chinedu and Wan-Mohamed (2016) support inclusion of sustainability learning in agricultural training to create capacity needed to address sustainability challenges threatening the natural resource base upon which agricultural development is sustained.

The integration of sustainable development into education and training must be guided by a clear policy directive for all levels of education and training to build capacity and skills to address sustainability challenges (Singer-Brodowski, Etzkorn, & von Seggern, 2019). Agricultural education and training can expedite a shift towards sustainable agriculture through building capacity and skills required for conservation of natural resources and sustainable food production. A shift towards sustainable agriculture demands that sustainable development be a central knowledge area within the agricultural training programmes (Zenelaj, 2013). Agricultural training programmes must allow students opportunities to learn about the concrete physical, technological and social aspects of natural resources for agricultural use. An agricultural curriculum can be used to produce environmentally responsible students through acquisition of values, attitudes and practices agreeable to sustainable development (Chittoor & Mishra, 2012).

The most practical method to integrate sustainable development is through existing TVET curricula used to develop both hard and soft skills. Sustainable development can be infused into the existing knowledge, practice and values of Primary Agriculture Curriculum. The infusion of sustainable development will empower students with knowledge, skills and values relevant for sustainable agricultural practices (Setiawan, 2017). For it is hoped that integration of sustainable development into agricultural education and training programmes like the Primary Agriculture qualification currently offered at TVET will result in creating the required capacity and skills to enable the sector to respond to pressing socio-economic and environmental demands.

1.2. Study Background

The sustainability challenges experienced throughout the globe demands that sustainable development be included in the core knowledge areas that every 21st century citizen must be empowered with. All levels of education and training, especially TVET institutions, must play a crucial role in transmitting sustainable development knowledge to students (Cheang et al., 2017). Similarly, the Sustainable Development Goals (SDGs) specifically highlight the crucial role that education and training can play in empowering students with knowledge and skills required for sustainable development (Singer-Brodowski et al., 2019).

Considering the above backdrop, the Academy of Science of South Africa (ASSAF) report raises an urgent need to improve the relevance of agriculture curricula in the South African TVET system (ASSAF, 2017). The agriculture curriculum needs to be restructured to include updated farming system approaches. An updated agriculture curriculum must have a strong emphasis on addressing local agricultural issues including social inclusion, environmental sustainability and resilience. The agriculture curriculum must also be reorganized to respond to regional and global issues such as trade, SDGs and climate change. This can be done through integrating knowledge areas such as sustainable production, environmental integrity, social benefits, consumer requirements and sustainability science in agricultural education and training (ASSAF, 2017).

It is also important to note that the demands to restructure agriculture curriculum happens under a backdrop of young people lacking relevant skills required for employment or entrepreneurship development in the agriculture sector. The shortage of the relevant skills cannot be divorced from the country's turbulent past where the majority black people were marginalised under apartheid. The majority of black people received education of poor quality which contributed to the poor skills regime to date (Wedekind, 2014). Despite several education policy changes and education expenditure reprioritization under the new democratic dispensation, poorly skilled graduates continue to exit at the different levels of the education and training system into unemployment, poverty and inequality. This backdrop is important to this study because the need to modernise the agriculture

curriculum is still impacted by the legacy of poor skills regime in the TVET system. The need to restructure the agriculture curriculum happens under continuing broader restructuring of the TVET system. This poses a challenge of competing demands in terms of prioritization and resource allocation as other pressing demands like increasing access and throughput in the TVET system may overshadow and take away resources needed to integrate sustainable development into agriculture curriculum (Majgaard & Mingat, 2012).

This study was prompted by the need to address sustainability concerns within the agricultural sector which continue to undermine the sector's ability to respond to other socio-economic challenges mentioned above. As stated above, the agricultural sector continues to face sustainability challenges such as climate change, land degradation and scarcity of natural resources, etc. The Primary Agriculture Curriculum offered at TVET colleges can be used to build capacity and skills to mitigate against sustainability challenges. UNESCO-UNEVOC (2013) encourages member states to use TVET qualifications and skills programmes to produce graduates who match sustainability requirements and understand their responsibility to protect the environment. However, TVET colleges appear to lack the capacity to re-orientate and re-direct their curricula in respect of sustainable development issues such as conservation of natural resources, social equity and suitable development. In many developing economies, including South Africa, practices in agricultural education and training do not show extensive integration of environmental and sustainable concepts and ideas into their educational and training programmes (Chittoor & Mishra, 2012).

1.3. Rationale for the Study

Agricultural enterprises in many parts of the world are threatened by sustainability challenges such as climate change and depletion of natural resources. Agricultural activities are responsible for 13.5% of greenhouse gas emissions across the world (ILO, 2011). These facts are reiterated by ASSAF (2017) which states that agriculture is both a contributor to and at the same time highly vulnerable to the effects of climate change. Agriculture accounts for approximately 14% of greenhouse gas emissions and 25% when including forestry and other land uses. The continuing in a business as usual approach to

increasing global food production creates considerable negative consequences from rising climate change effects. Because agriculture is entirely dependent on the biophysical environment, it is the only productive sector most exceptionally vulnerable to changes in climate patterns.

Agriculture enjoys the benefit of being an area where environmental, economic and social impacts of farming systems can be made evident on a global scale. With increasing sustainability concerns, there is a growing world agreement on the need to reform traditional agricultural practices into sustainable practices (Ahlem and Hammas, 2017). Reforming agricultural practices requires relevant corresponding knowledge and skills. Building relevant corresponding knowledge and skills in return requires widespread revision of current agricultural curricula, qualification standards and training programmes at all levels of Technical and Vocational Education and Training (Strietska-Ilina et al., 2011).

The ILO (2011) credits agriculture as the largest employer in the developing world. In a developing economy like South Africa, the primary agricultural sector contributes about 3% to the country's gross domestic product (GDP) but if the entire value chain of agriculture is taken into account, agriculture contribution to GDP reaches about 12% (ASSAF, 2017). Additionally, the South African NDP focuses on employment creation, access to basic social services and redistribution of access to assets for economic development. An analysis of the National Development Plan (NDP) targets decisively puts agriculture on the agenda for the next 15 years (ASSAF, 2017). Greyling (2012) states that South African government has prioritised creation of employment as one of its main goals. The government has identified agricultural value chain as one of the six key drivers of employment creation through New Growth Path (Greyling, 2012). However, a case must be made that the potential of agricultural value chain to employment creation, poverty alleviation and food security is dependent on sustainable agricultural practices and the health of the biophysical environment. To reform current farming systems into sustainable farming would require that agriculture curriculum at TVET institutions be reoriented to build capacity and skills responsive to sustainability needs of agricultural industries and societies (Chinedu & Wan-Mohamed, 2016). According to Handayani (2019), building

capacity and skills to respond to sustainability demands in agriculture can be realised through agricultural training programmes that produce high quality graduates with capacity to implement sustainable development obligations.

1.4. Research Topic

An investigation of the integration of environmental and sustainability content into the National Certificate Vocational (NCV) Primary Agriculture Level 3-4 curriculum in the South African TVET system.

1.5. Research Problem

Governments and their training institutions in many developing economies have not yet responded to the skill challenges associated with sustainable development (Strietska-Ilina et al., 2011). This challenge also affects the South African TVET system as it also does not show a serious up-take of skills related to sustainable development (Pavlova, 2009). The training responses to sustainability concerns in developing nations are often isolated and sporadic, with very little impact on transitioning their industries and economies towards sustainable development (Pavlova, 2009). Similarly, the ILO (2011) states that TVET institutions in many developing countries are inclined to respond slowly to new educational demands on sustainable development. Gokool-Ramdoo and Rumjaun (2017) made a claim that current education and training systems are inadequately equipped to sustain the SDGs. Therefore, there is a need for an alternative education and training characterized by creation of a new educational order consistent with sustainable development.

Nations across the world are confronted with sustainability challenges, thereby demanding that their education and training systems establish niches within curricula where sustainable development content can be included. Scholars like Pavlova (2016) encourage inclusion of sustainable development into existing college subjects, modules and units. However, caution must be raised that inclusion of sustainable development into education and training programmes is demanded under conditions where colleges are overstretched to take on more curricular responsibilities than ever before. It is important to establish whether the education and training institutions have the requisite support, resources, skills and experience to support the new curricular demands (McGrath, 2004). The apparent lack

of significant take-up of sustainable development within education and training institutions in developing nations and the glaring need to respond to sustainability challenges through education and training systems are two areas of concern to this study. Hence, the need for a study to investigate the integration of sustainable development into the Primary Agriculture Curriculum.

1.6 Research Objective

The objective of this study was to investigate the integration of environmental and sustainability content into the Primary Agriculture Curriculum at National Certificate Vocational (NCV) level 3-4 within the TVET system. An analysis of the status of integration of sustainable development issues into the Primary Agriculture Curriculum was conducted. The analysis focused on the three dimensions of sustainability (social, economic and environmental) and three vocational education foci areas (cognitive, practical and aesthetic). The study was aimed at achieving the following:

- To examine the policy directive on sustainable development for the TVET system and NCV programmes.
- To examine extent of sustainable development issues integrated in Primary Agriculture qualifications.
- To identify gaps and opportunities within the Primary Agriculture Curriculum for integration of sustainable development issues (concepts, values, principles and perspectives) in order to provide an empirical example on how to include sustainability issues across the NCV programmes.
- To promote sustainable agriculture through development of sustainability skills for the primary agricultural sector.

1.7 Research Questions

This study investigated the integration of environmental and sustainability content into the NCV Primary Agriculture Curriculum level 3-4 in South African TVET system. The study sought to answer the main research question and sub-research questions listed below in order to achieve the above research objective.

1.7.1 The Main Research Question:

The main research question to be explored in the quest to investigate the integration of sustainable development in the Primary Agriculture Curriculum at TVET is as follows:

"How is sustainable development integrated into the NCV Primary Agriculture Curriculum offered at TVET Colleges?".

1.7.2 Sub-research Questions

In order to simplify data collection to respond to the main issue(s) under study, the main research question was divided into sub-research questions as follows:

- How does the NCV policy support integration of sustainable development into Primary Agriculture Curriculum?
- What are the key sustainable development concepts that need to be considered for Primary Agriculture Curriculum?
- How is the knowledge of sustainable development integrated in the Primary Agriculture Curriculum?
- What are the lecturers' perceptions of teaching sustainable development in the Primary Agriculture Curriculum?
- What are the lecturers' knowledge and pedagogy needs for the integration of sustainable development content in the Primary Agriculture Curriculum?

1.8 Conclusion

South Africa as a developing economy still relies on agricultural development to address the socio-economic challenges like unemployment, poverty and inequalities. As indicated above, agriculture remains a priority area for creating employment in the country's planning and growth frameworks. Therefore, a study focusing on integration of sustainable development into the Primary Agriculture Curriculum is needed to strengthen agricultural development in the country. The inclusion of sustainable development will empower students with skills, knowledge and values needed to address sustainability challenges

undermining agricultural development. For the agricultural sector to realize its full potential in addressing the socio-economic challenges, the sustainability concerns affecting the sector must be resolved first.

The sustainability challenges demand that the world community includes sustainable development at all levels of education and training to foster acquisition of skills, knowledge and values required to transform society into sustainable living. The acquisition of sustainable development skills, knowledge and values empowers graduates to conserve ecological resources whilst promoting economic development with reduced impact on ecosystem services (Chinedu & Wan-Mohamed, 2016).

Therefore, what motivated this study was to understand what integration of sustainable development entails, what direction must integration of sustainable development follow and what is to be achieved by integration of sustainable development in the sphere of Technical and Vocational Education and Training (Chinedu & Wan-Mohamed, 2016). This study investigated the integration of sustainable development into the Primary Agriculture Curriculum with the hope to clarify these issues raised by Chinedu and Wan-Mohamed (2016).

CHAPTER TWO: LITERATURE REVIEW

2.1. Introduction

The literature review traces developments on the integration of sustainability content into the Technical and Vocational Education and Training (TVET) in general and the Primary Agriculture Curriculum in particular. According Pavlova (2009) inclusion of sustainable development issues into TVET is crucial for acquisition of skills, action competences, knowledge and values required to build ecologically sustainable, socially just and economically viable societies. The literature gathered through the study is used to motivate and guide integration of sustainable development content into the National Certificate Vocational (NCV) programmes.

This chapter traces key literature and bodies of knowledge underpinning this study on the inclusion of sustainable development in the Primary Agriculture Curriculum offered at TVET colleges. The literature review for this study starts with tracing the origin of TVET and its historical developments. This is done to highlight the original purpose of TVET and how it has evolved through TVET's historical developments. Understanding the original purpose of TVET ensures that this study's intent to promote inclusion of sustainable development strengthens the purpose of TVET and increases the capacity of TVET to respond to emerging sustainable development trends. The literature also covers developments on the origin of sustainable development and its role as a global framework for development guiding the transitioning of economies and societies towards a sustainable path. Further on, literature review is used to justify the need to include sustainability skills in the TVET system to enable economies and societies to respond to sustainable development obligations. The literature also covers models or frameworks developed and used elsewhere to demonstrate how integration of sustainable development can be practically implemented in TVET curricula. The literature is also used to explain the importance of sustainable development in influencing and shaping agricultural practices. The literature is used to describe the structure of the NCV programmes and curricula offered at TVET. This assists with identifying where integration of sustainable development can be implemented. The literature review encompasses the status of

agricultural education and training in South Africa which is important for this study to understand actual practice and shortcomings in order to establish areas that must be strengthened. With the study focused on promoting inclusion of sustainable development in TVET, it is essential to use literature in establishing practical constraints experienced in embedding sustainability skills within the existing skills programmes. The literature review concludes with a conceptual framework outlining the interrelated ideas, concepts and variables used to describe, analyze and interpret the study.

2.2. The Foundations of Technical and Vocational Education and Training

In tracing the origin of TVET in the United Kingdom (UK), Young (2009) shows that courses aimed at providing work experience for the youth have been the root of a wide range of technical and vocational programmes. The work experience was gained through a master-apprentice relationship, where an apprentice acquired trade experience under the supervision of an experienced artisan (Young, 2009). This form of apprenticeship was the first example of what is now called vocational education. This implies that, in its historical framing, vocational education was about addressing the practical activities of the workplaces (Young, 2009). In the same vein as articulated by (Young, 2009), UNESCO posits that TVET programmes must promote acquisition of knowledge and skills for the world of work (UNESCO, 2012, p. 5). TVET programmes develop practical skills, technical know-how and understanding essential for employment in specific professions (UNESCO, 1997).

Similarly, various scholars postulated the same idea on the purpose of TVETs as responding to the practical activities of the workplaces. According to Feinberg (1983) the purpose of TVET is to transfer usable knowledge to the job market. This view is supported by Clarke and Winch (2007) who posit that TVET's role is to prepare youth and adults for working life. Similarly, Chisholm (1992, p. 2) mentions that vocational education means training for a specific set of careers while Stevenson (1997) regards developing competences for work as the value of vocational education. The countries following the Anglo Saxon approach to TVET prepare young people for specific occupations, thereby responding to the needs of industries (Kraak et al., 2016). Moodie (2008) sees TVET

programmes as means to acquire knowledge and skills required for middle level jobs. Furthermore, Gamble (2006) argued that the need to develop skills for employment remained a major attribute that distinguishes TVET from the other types of education. Similarly, Pavlova (2009) reiterated the main goal of TVET as direct preparation for work. TVET has been seen as providing specific training with the intention to develop understanding of a particular industry with specific skills or tricks of the trade (Pavlova, 2009).

The significance of the above historical account on the origin and purpose of TVET to this study is to make a case that the integration of sustainable development must be within the existing TVET programmes preparing students for work. This will ensure that, upon joining workplaces, graduates are empowered with sustainable development knowledge, skills and values that will transform the workplace practices from within. Understanding the foundation and purpose is crucial in establishing the points of integration in the TVET programmes.

2.3. The Historical Context of TVET in South Africa

South Africa shares the same historical foundation as UK on the origin of TVET. The South African TVET system derives from the same basis of providing skills for employment to the youth (Badroodien, 2004). It is important to note that South Africa is a former colony of the UK and therefore, shares a common educational heritage with UK (Smuts, 1937). This common educational heritage is reproduced in the continuing purpose of TVET programmes in providing middle level knowledge and skills to assist young people entering the economy (DHET, 2012, p. 1)

The vocational education in South Africa originated from the demands to provide employment for the youth during the industrial development of the late 1800s. This period saw an outgrowth of mining industry, railways, harbours and small engineering workshops in urban centres (Smuts, 1937). Smuts' historical account of TVET is supported by Badroodien (2004) who states that vocational education emerged to develop a workforce demanded by the economic needs at the time. This has remained the fundamental motive for vocational education to date.

The history of Vocational Education and Training (VET) in South Africa has evolved with some controversies. VET has been associated with low educational status due to racial divisions of the past where technical education was regarded as training to do "kaffir" work, to which white students avoided because it was regarded as degrading and unacceptable (Muller, 2009). Furthermore, past discriminatory policies led to the democratic government inheriting a racialized, unequal and extremely poor skills regime. Consequently, it is advisable that future reforms of technical and vocational educational take cognizance of history and the complex ways in which history continues to impact on students (Swartz, 2015; Badroodien, 2004).

The South African democratic government, founded in 1994, took over an unequal system of education based on racial classification under the Apartheid era. The education and training landscape continues to reflect the legacy of unequal and unfair funding (DoE, 2001). The Apartheid discriminatory policies prompted massive educational policy changes by the newly elected democratic government in 1994. The democratic government had to restructure TVET college sector to address the past inequalities and resulting myriad of social challenges (Terblanche, 2017).

With majority of students in the restructured TVET system coming from the previously disadvantaged communities and mainly black, it is important to reflect on this background and note how these facts continue to affect access and throughput of students enrolled in TVET programmes. This study's purpose is to examine integration of sustainable development, which has implications for TVET due to historical facts and the continuing need to restructure the system.

2.4. The post-apartheid development TVET system in South Africa

The post-apartheid TVET system continues to prepare youth for work. Apart from addressing transformation challenges such as improving access, equity, output, employment, etc., the post-apartheid TVET system also faces the challenge to simultaneously respond to the demands of globalisation including SGDs and green economies. More than just preparing people for work, the TVET system must also drive the country towards higher levels of skills competitiveness (McGrath, 2004, p. 161). In a

competitive global economy, a successful TVET system must provide diversified programmes for students to acquire knowledge, skills, attitudes and values to function as economically productive members of society. The diversified college programmes must build skills and competencies needed for the country to chart its own course in a globally competitive world (Gamble, 2004).

The Department of Higher Education and Training (DHET) is the custodian of Technical and Vocational Education and Training (TVET) system. DHET provides support to TVET colleges in order to strengthen vocational training programmes and expand access to colleges. DHET seeks to turn TVET sector into an alternative and attractive option for the majority of students. Under the leadership of DHET, TVET colleges are steered towards empowering school leavers with skills for employment in a competitive labour market, as well as building the capacity of graduates to respond to the needs of the surrounding communities. There are 50 public TVET colleges in South Africa spread across all provinces (DHET, 2013).

This section has outlined the two critical roles of TVET in post-apartheid era, namely, preparing students for the world of work and driving the economy towards higher levels of competitiveness. A study emphasizing inclusion of sustainable development into TVET curricula must be mindful of the implications and magnitude of competing demands within TVET colleges in order to clarify that integration is not an extra-curricular activity but an enabler for the TVET curricula to achieve its mandate and respond effectively to these critical roles.

2.5. TVET Curriculum as basis for linking skills with underpinning knowledge and values

Despite the historical framing of TVET as directly linked to industry, several scholars made arguments for the modernization of TVET to have a closer connection to everyday life and emerging socio-economic and environmental trends. TVET's association with preparing students for work focuses on building skills or competences at the disadvantage of other important educational goals, i.e. knowledge and values. TVET must equally promote increasing or broadening knowledge that underpins work performance as well as acquisition of values that inform actions/practice (Gokool-Ramdoo & Rumjaun, 2017).

Similarly, Pavlova (2009) states that it is worth noting that job performance is not only dependent on skills and competences, but also knowledge and understanding that underpin work. Therefore, in the world of today, sustainable development forms part of the new knowledge and understanding that should be incorporated into vocational education. Furthermore, Winch (2011) states that the concept of skill was originally associated with performance of manual labour, but scholars argue that a skill must also contain aspects that relate to mental tasks and social interactions. In the real work context, a skill expresses character, virtues and wisdom required to carry out job function (Winch, 2011). The relevance of above argument to the study is to indicate that a skill which is demonstrated through performance has underpinning knowledge and values. Therefore, an appropriately skilled graduate must reflect the underpinning knowledge and values at the workplace. The connection to everyday life and emerging socio-economic and environmental trends happens through application of supporting knowledge and values.

The curriculum forms a foundation for acquisition of skills and their underpinning knowledge and values. Several scholars articulate the need for curriculum to prepare students to respond to demands of everyday life. Ross (2000) states that a modern day curriculum must articulate what needs to be learned. In a similar vein, Carl (2012) posits that the curriculum is a tool that can be used to prepare students for life. Moreover, Parkay and Hass (2000) refer to curriculum as tool guiding what is worth experiencing, doing and being. Stark and Lattuca (1997) refer to the curriculum as an outline of activities planned to support achievement of specific educational goals by students. Tyler (1949) went a step further to argue on the need for the curriculum to provide practical tools for students to accomplish specific educational goals. More importantly, a curriculum enables students to acquire experiences and knowledge to address real-life sustainability challenges (Tyler, 1949). As already stated above by Pavlova (2009), in the world of today, sustainable development forms part of the new knowledge and understanding that should be incorporated into vocational education. This part of the literature was used to lay the foundation for integration of sustainable development knowledge and values into the existing TVET skill programmes. This will also prevent the lecturing staff at TVET from viewing inclusion of sustainable development as an add-on or extra-curricular activity.

2.6. The Growth of Sustainable Development Agenda

Signs of sustainability concerns were evident from the start of the 20th Century. A Russian scientist named Vernadsky began to raise ideas on harmonizing the interrelationships between environment and world community (Pavlova, 2009). Literature shows that sustainable development emerged from efforts to balance sustainability concerns on the increasing signs of ecological destruction from human activities and the socio-political concerns on human development (Robinson, 2004). Despite the early signs of sustainable development from 20th century, it was actually from the beginning of the 1970s that the world experienced a remarkable rise of environmental consciousness which resulted in the United Nations adopting the concept of sustainable development as global agenda and it then became a global framework for development. From early 1980s, sustainable development began to be a serious part of international discourse. Governments, business, academia and civil society around the world started to be concerned about the future of humanity and quality of life for future generations (Pavlova, 2009).

To date, sustainable development has infiltrated government planning and development frameworks and various academic disciplines. The term has evolved into one of the universal icons of modernity. The world over, scholars and policy makers view the concept as the central challenge of our times (Wheeler, 2002, p. 110). Similarly, Harrison (2000) called sustainable development the defining issue of the 21st century. The recent launch of the Sustainable Development Goals (SDGs) by the United Nations and endorsement by member states elevated sustainable development to highest global development agenda (UN, 2015)

Brundtland (1987) coined the concept of sustainable development which signalled a shift of emphasis away from the environment only to including human development issues. Brundtland, (1987) defines sustainable development as development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs. However, Geisinger (1999) argues that there seems to be no single, agreed-upon definition of sustainable development. The concept of sustainable development is reflected in terms of a conflict between goals of economic growth and

environmental conservation, where in most instances economic growth becomes the preferred option.

The central principle of sustainable development is that present decisions should not damage the prospects for improving and sustaining living standards in the future. The principle suggests that economic systems should be maintained in a way that present generations are able to survive off current natural resources whilst sustaining the natural resource base for future generations to survive equally well or even better (Jabareen, 2004, p. 630). Accordingly, (Pavlova, 2009) states that sustainable development empowers societies to realize their potential by improving quality of life in ways that protect and enhance the Earth's life support systems. Wilson and Tyrchniewicz (1995) view sustainable development as a process of change whereby the use of resources, direction of investments, orientation of technological development and institutional change guarantee the continuous potential to meet human needs.

Solow (1991) states that sustainable development is a commitment by the current generation to conduct its affairs in a way that it leaves future generations with possibilities or ability to be well off as well. Therefore, sustainability is a command not to satisfy present generation by bankrupting successive generations (Jabareen, 2004). A truly sustainable society integrally addresses issues relating to social needs, equity, welfare and economic prospects within the ecological limits imposed by supporting ecosystem services (Agyeman et al., 2002, p. 78). More importantly, scholars, environmentalists, practitioners and policy makers agree that sustainable development cannot be realised without an effective equilibrium of social, environmental and economic objectives (Jabareen, 2004, p. 630).

Tracing the growth of sustainable development in the literature review is crucial for the study in order to strengthen the knowledge and understanding of the concept. The historical development of the concept shows how the concept has progressively grown to infiltrate policy and developmental agenda at various levels of society from local to regional to international. Its growth signals how important it is for every living being to be empowered and skilled with sustainable development knowledge and understanding, therefore all levels of education and training must be permeated with sustainable development.

2.7. The need to incorporate development of sustainability skills in TVET.

The preceding part has articulated how sustainable development evolved into a global agenda over a period of time due to rising sustainability challenges and need for policy and academia to promote development of skills needed to respond to these sustainability challenges. Muramba et al. (2005) mention that sustainability concerns such as global warming, changing climatic patterns, floods, drought, rising sea levels, depletion of natural resources are experienced all over the world. All societies across the globe need to reconsider their development patterns in order to survive these sustainability challenges. To mitigate against these sustainability challenges, current economic practices must be shifted towards a sustainable development path (Muramba et al., 2005).

Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) regards TVET as central in building sustainability skills needed to improve economic, environmental and social well-being of societies (GIZ, 2014). European Centre for the Development of Vocational Training (CEDEFOP) refers to sustainability skills as knowledge, practices, values and attitudes required for societal development and efficient resource management (CEDEFOP, 2019). Therefore, sustainability skills are needed by workforce to develop and promote social, economic and environmental revenue in businesses, industries and societies (CEDEFOP, 2019). Similarly, Kamis et al. (2017) refer to sustainability skills as technical skills, values and attitudes needed to promote sustainable development in the workplace.

The literature review shows that several writers expressed the need to include sustainability skills in the TVET. These writers validated the importance of sustainability skills towards addressing sustainability challenges as articulated above by (Muramba et al., 2005). Gamble (2013, p. 208) advocates for explicit vocational instruction that produces work-ready graduates with skills needed for a sustainable economy and society. TVET programmes can be used to empower students with skills for sustainable jobs. Sustainability skills enable people to conserve the quality of environment while improving human well-being and social equity (Fien, Mclean, & Park, 2009). Sustainability skills can empower people to become active and environmentally responsible citizens, workers and consumers with capacity to resolve local and global environmental challenges.

Sustainability skills ensure that workers are able to play appropriate roles at workplaces to achieve environmental, economic, and social sustainability (Acedo, 2014). Including sustainable development issues into TVET qualifications and programmes promotes development of skills that are required for a sustainable development trajectory (Pavlova, 2016).

The above enunciations by the writers are important to this study as they underscore the need to build sustainability skills required to address sustainability challenges and to transition economies towards a sustainable development path. The assertions by these writers on the importance of sustainable development skills support the need to establish major drivers for the integration of sustainable development into TVET curricula.

2.8. An approach to integrate Sustainable Development into the Primary Agriculture Curriculum

After establishing the significance of building sustainability skills through TVET, it is of critical importance to demonstrate how sustainable development can be included in the Primary Agriculture Curriculum. This will be done by using the systematic approach to sustainable development curriculum planning developed by Pavlova (2009). The TVET qualifications can be used to create inspiring and creative learning environments by including ecological, economic and socio-cultural issues into their curricula. Inclusion of sustainable development issues can nurture acquisition of knowledge, skills, attitudes and values leading to more sustainable livelihoods. Nurturing ethics, attitudes and values compatible with environmental protection must form the core of TVET curricula (Pavlova, 2016). In addition, TVET curricula are favorably placed to build a sustainable world by preparing a labour-force empowered with sustainability principles and practices through various vocational and technical qualifications offered. As already stated, TVET is a sphere of the education and training system that has a direct link to and impact on workplace activities (Chinedu & Wan-Mohamed, 2016).

The inclusion of sustainable development concepts and principles does not add extra-curricular work on lecturers as the focus is integration into an already existing TVET curriculum (UNESCO-UNEVOC, 2017). Accordingly, Pavlova (2009) recommended that

inclusion of sustainable development content must not be considered as an additional subject or competing priority to already existing TVET programmes but rather as a holistic way to delivering and improving the educational objectives. Table 1, below, demonstrates a basic framework developed by Pavlova (2009) that can be used to guide and plan inclusion of environmental and sustainability content into the Primary Agriculture Curriculum (Pavlova, 2009). The framework shows how the inclusion can be done in the light of the three dimensions of sustainable development (social, environmental and economic) and three education foci (cognitive, practical and aesthetic). The framework can be used as guideline for conceptualising how to bring together vocational curriculum and sustainable development (Pavlova, 2009).

Table 1: A systematic approach to sustainable development curriculum planning

	Social	**Environmental**	**Economic**
Cognitive			
Practical			
Aesthetic			

Source: (Pavlova, 2009, p. 93)

Table 1 above can be used to plan different learning activities focusing on one or more aspects of sustainability. Lecturers at TVET colleges can choose sustainable development aims that can be addressed through their particular curriculum (Pavlova, 2009, p. 93).

The Pavlova framework enunciates a curriculum planning tool that guides inclusion of sustainable development emphasis in the cognitive, practical and aesthetic aspects of the curriculum. The cognitive focus on sustainability happens when curriculum instils acquisition of knowledge and understanding on the importance and meaning of sustainable development by students. The practical focus on sustainable development happens when curriculum includes attainment of skills and abilities needed for sustainable actions in workplaces and societies. The aesthetics focus ensues when curriculum instils acquisition of values, ethics and attitudes agreeable and friendly to sustainability practices (Pavlova, 2009).

The Pavlova framework is supported by Setiawan (2017) who views sustainable development skills as encompassing cognitive, psychomotor and affective domains. These domains reflect sustainability skills as constituted of knowledge, abilities and values required by workers to promote sustainable development. The knowledge part of sustainability skills signifies the information required for environmental conservation. The abilities part denotes practical know-how to address sustainability concerns. The values part shows the drive and motivation to conserve natural resources. To achieve all-encompassing sustainability skills requires a holistic and balanced inclusion of environmental, social and economic objectives in the curriculum. Furthermore, UNESCO (2015) refers to sustainability as an end goal of the complementarity of social, economic and environmental aspects. This part of literature has addressed the core objective of the study, which is to demonstrate how sustainable development can practically be integrated into the Primary Agriculture Curriculum in light of the three educational foci and dimensions of sustainable development.

2.9. The National Certificate Vocational (NCV) Structure in the TVET Sector

In general, the South African NCV system was adapted from the US federal education code which describes TVET as competency-based applied training that empowers students with knowledge, higher order reasoning and problem-solving skills. The US model influenced the South African approach to NCV programmes (DoE, 2006). For the integration of sustainable development to take effect, knowledge and understanding of the structure of the Primary Agriculture Curriculum is very important. An outline of the curriculum structure shows the exact points where sustainable development can be included in the teaching and learning of content in the vocational subjects.

The NCV qualifications pitched at levels 2 to 4 in the National Qualifications Framework (NQF) were introduced in 2007 (DoE; 1998). The NCV qualifications were developed to address the following challenges:

- poor quality programmes;
- lack of relevance to economy; and
- low quality of technical and cognitive skills.

The NCV qualifications comprise fundamental and vocational subjects. The fundamental subjects build the foundation for all other learning areas whereas the vocational subjects cover specific subject content areas for the qualification. The vocational subjects each represent a specific area of specialisation (DoE, 1998). Therefore, an outline of this qualification is critical in achieving the objective of this study which is to investigate the integration of environmental and sustainability content into the Primary Agriculture Curriculum at NQF levels 3 to 4.

The NCV Primary Agriculture Curriculum level 3 empowers students with knowledge, skills and competence for employment at intermediate levels. The curriculum comprises subjects covering theoretical knowledge combined with the practical skills and values relevant to specific vocational area (DoE, 1998). As a sequel to level 3, the NCV Primary Agriculture Curriculum level 4 enables students to acquire knowledge, skills and competence for employment in a specific occupation or class of occupations. The NCV level 4 also allows students admission into higher education (DoE, 1998). The Primary Agriculture Curriculum comprises fundamental subjects, namely, Language, Mathematics or Mathematical Literacy and Life Orientation and vocational subjects consist of Soil Science, Farm Planning and Mechanization, Plant Production, Advanced Plant Production, Animal Production and Agri-Business (DoE, 2011).

The NCV qualifications were conceptualized to increase prospects for employment, entrepreneurship and access to higher education. Unfortunately, students in NCV programmes continue to struggle with access to work integrated learning needed to gain work-based experience in order to maximize their employment prospects (Terblanche, 2017). Furthermore, the NCV policy has not addressed all needs of vocational qualifications and does not enjoy the full support of industries, specifically in artisan training (Kraak et al., 2016).

The above part of literature review shows the vocational subjects that are offered under the Primary Agriculture qualification. The proposed integration of sustainable development into the Primary Agriculture Curriculum must take effect in the content areas currently taught under the vocational subjects. As has been stated already in the previous section by

Pavlova (2009), the inclusion of sustainable development content must not be looked at as an additional subject or a competing priority to already existing content areas but rather as a holistic way toward delivering and improving the educational objectives. It is therefore advisable to integrate sustainable development aspects into the already existing agriculture content in the vocational subjects.

2.10 The importance of including Sustainable Development into the Primary Agriculture Curriculum.

It has already been stated in the literature review and elsewhere in the study that agriculture is among the top polluters of the environment and is also highly vulnerable to environmental degradation as it is entirely dependent on the same environmental resources. Agricultural practices in many parts of the world are threatened by environmental degradation including droughts, climate change effects and the depletion of natural resources. Agricultural practices are responsible for 13.5% of greenhouse gas emissions across the world (ASSAF, 2017). ILO identified agriculture as a major contributor to greenhouse gas emissions, soil degradation, desertification, freshwater scarcity and biodiversity loss among other related environmental issues. Therefore, reducing greenhouse gas emissions will require developing new and relevant skills (ILO, 2018). Agricultural approaches must adapt to changing and worsening climatic conditions. Reducing the depletion of natural resources and adapting to worsening climatic conditions require massive skilling and re-skilling of farmers on sustainability knowledge and technologies. Therefore, to address these sustainability challenges requires widespread revision of current agricultural curricula, qualification standards and training programmes at all levels of TVET (Strietska-Ilina, Hofmann, Durán Haro, et al., 2011).

Nurturing sustainable agricultural practices has massive skills development consequences for workers, especially in developing countries. Agriculture accounts for the highest employment rates in the developing world (ILO, 2011). Introducing sustainable agricultural practices will change the world of work leading to creation of decent work in the agriculture sector. Infusion of sustainable agricultural practices will promote food security with reduced environment impacts (Greyling, 2012). FAO (2016) defines sustainable agriculture as agricultural practices that promote resource efficiency, resilience

and accountability in farming and food systems in order to ensure sustainable food security and nutrition for all, now and in the future. Similarly, D'Souza et al., (1993) refers to sustainable agriculture as a farming system involving sustainable practices with the less use of practices that are potentially destructive to natural resources.

Sustainable food security is only possible if it is complemented with environmental conservation. To promote sustainable agricultural practices, concerted efforts are required to incorporate sustainability skills development into TVET agricultural programmes. The sustainability skills will increase capacity to reverse negative environmental impacts. Agriculture must prioritize issues of sustainable development. Agricultural enterprises must pay exceptional attention to sustainability of both agriculture and natural resources, which is crucial in realizing the economic, social and environmental benefits (Wilson & Tyrchniewicz, 1995). Agriculture enjoys the benefit of being an area where significant environmental, economic and social benefits of farming systems can be made more practical on a global scale. Thus, unsustainable modern agricultural enterprises require replacement with more sustainable options based on environmentally friendly practices. There is a growing unanimity on the need to transform conventional farming practices into sustainable practices (Ahlem and Hammas, 2017). Sustainability learning in TVET Primary Agriculture Curriculum will impart knowledge and skills required to address sustainability concerns whilst stimulating sustainable agricultural development. Sustainability learning creates awareness, understanding, values and attitudes that strengthen commitment to conserve the quality of environment (Kamis et al., 2017).

This part of literature reflects on the importance of embedding sustainable development in agriculture curriculum to promote sustainable practices in agriculture due to its role and contribution to food security and development without compromising the biophysical environment upon which it depends. The integration of sustainable development into the Primary Agriculture Curriculum can promote adoption of sustainable agricultural practices.

2.11. The Status of Agricultural Education in Vocational Programmes in South Africa

It is important for literature to reflect on the status of agricultural education and training in the country. For integration of sustainable development to have effect, the study must be well acquainted with the thinking, practice and processes currently under way in the implementation of agricultural education and training. The literature indicates that the agriculture as a sector in South Africa remains a significant contributor to the country's economic growth. The agriculture sector creates more jobs than any other productive sector. As a sector, agriculture plays a central role in alleviation of poverty and food shortages (ASSAF, 2017). Therefore, examining the status of agricultural education in vocational programmes is necessary to establish how TVET can continue to support agricultural development whilst embracing emerging demands for sustainable approaches and technologies.

The National Development Plan (NDP) demands that all levels of agricultural education and training programmes must be used to advance skills development in the agriculture sector. The training programmes must emphasize development of a new cadre of agricultural extension officers. The NDP calls for significant growth in students enrolment and output of high-quality graduates from TVET/NCV agricultural programmes. However, while there is no lack of registered qualifications on agriculture in the NQF, there is an urgent need to improve relevance of NCV agricultural curricula and programmes (ASSAF, 2017). The biggest shortcoming of the TVET system has been a low graduation rate of fewer than 32% on NCV programmes (Wedekind, 2016). The system needs a substantial transformation to increase the number of graduates in agricultural-related qualifications. Nationally, there is no accessible systemic level figures to quantity employment trends of agricultural graduates (Wedekind, 2016).

There are currently 13 TVET colleges offering NCV agricultural programmes. The agricultural programmes offered are vocational in nature. The TVET system offers three types of agricultural programmes, i.e. NCV programmes, national diploma and skills programmes (Wedekind, 2016). An analysis of the NDP goals decisively puts agriculture

as a top priority for the 15-year period of its implementation. However, the prioritization of agriculture is circumvented by lack of clear policy goals driving the growth of agricultural education and training in the country (ASSAF, 2017).

This part of literature review is valuable to this study as it paints a clear picture of the actual practice of agricultural education and training in the country. It is necessary to examine the current status of the coverage of sustainable development issues within agricultural education in TVET programmes to ensure that the study is based on actual practice in order to address material issues. It is hoped that this will enable the study to come up with recommendations to strengthen inclusion of sustainable development issues in agricultural education and training at TVET level.

2.12. Constraints on integration of Sustainable Development into the Primary Agriculture Curriculum

The major drivers for sustainable development can be identified through an investigation of constraints experienced on inclusion. Literature review in this part will enable this study to explore practical solutions to simplify and promote inclusion of sustainable development into the Primary Agriculture Curriculum. The TVET system still lacks assessment instruments to certify sustainability skills in the existing qualification standards. The absence of accreditation and endorsement, combined with a low demand for sustainability skills, hinders integration (Pavlova, 2016). Many TVET colleges have no access to staff professional development programmes because management still lacks the capacity to support development of sustainability skills, values and attitudes among staff (Pavlova, 2016). TVET lecturers lack capacity, resources and time to teach sustainability content (Pavlova, 2016). Likewise, the ASSAF report raised a worrying concern on the quality of lecturers who are not appropriately qualified to teach agriculture in vocational training colleges (ASSAF, 2017). Cheang et al., (2017) states that without experienced and competent teachers, any well-designed educational programme would not be able to achieve its educational value.

Generally, agriculture is not a career of first choice to the majority of students. TVET colleges do not attract high-quality students for post-school agricultural studies. Even the quality of agricultural graduates is compromised by lack of resources and equipment for practical agricultural training together with a limited number of suitably qualified lecturers (ASSAF, 2017). The major source of funding for agricultural education in developing nations such as South Africa is government which is often of limited significance to explore curricular activities that are of more relevance to evolving societal development needs (Chittoor & Mishra, 2012).

The lack of coordination within research-teaching-extension service nexus hinders the flow of information and new knowledge demands into the TVET system for infusion into their programmes (ASSAF, 2017). Governments still lack capacity to introduce policy frameworks promoting addition of sustainable development imperatives into the TVET in order to decrease the time gap between new demands for sustainability skills from industries and for the TVET programmes to deliver on these demands (Pavlova, 2016).

Demand for sustainability skills is mainly influenced by government regulations, incentive schemes and other initiatives. TVET providers are trying to maintain close links with industry in order to adjust their courses to meet current demand; however, they are not so resilient in anticipating future skills demand. Therefore, if we are to ensure that existing occupations become sustainable and that sustainable jobs creation is scaled up, a great deal of political support and commitment is required (Pavlova, 2016).

Many governments' standpoint that emphasises development first and sustainability later impedes inclusion of sustainable development into skills programmes preparing future workers to promote sustainable growth (Pavlova, 2016). Government policies should inspire practices that are consistent with sustainable development. There is an increasing demand for policy options that are favourable to sustainable provision of ecological services (Wilson & Tyrchniewicz, 1995). Notwithstanding that South Africa lacks a formally approved inclusive policy on sustainable agricultural practices, there is a working document on sustainable development in agriculture and several sector policy guidelines defining South Africa's aspiration for sustainable development path (Khwidzhili & Worth,

2017). Furthermore, ASSAF (2017) mentioned that, despite widespread acceptance of the essential role of agricultural education and training in igniting agricultural transformation, there was until very recently no credible and overarching continental-level framework with a realistic and achievable concomitant strategic plan to effectively address the core problem of human capacity deficit within the Agricultural Innovation System.

This part of the study has identified the major constraints that may be obstructing the inclusion of sustainable development into the Primary Agriculture Curriculum. It is very crucial for this study to understand the constraints as they will have an impact on the application of study recommendations. Understanding the constraints experienced by the TVET system on integration of sustainable development will ensure that the study recommendations are as practical as possible and not far-fetched.

2.13 Study Conceptual Framework

This part of the report introduces a conceptual framework describing key integrated ideas and concepts to be studied (Liehr & Smith, 1999). The conceptual framework provides a summary of interrelated factors that influence the integration of sustainable development into the NCV Primary Agriculture Curriculum. It also guided this study by providing a holistic view of ideas and concepts critical to the inclusion of sustainable development in Primary Agriculture Curriculum. The ideas and concepts constituting the framework were used as analytical tools to clarify issues in order to create a clear understanding of the problem under investigation (Imenda, 2014, p. 189). The conceptual framework guided in framing of research approach including research design, target population and research sample, data collection and analysis. Furthermore, the conceptual framework guided the study in data collection, analysis and explanation (Imenda, 2014).

The conceptual framework was designed to explore the main ideas and concepts and their interrelationships in this study which explores the integration of sustainable development in the Primary Agriculture Curriculum (Jabareen, 2008). The framework is designed around the key ideas and concepts illustrated in Table 2 below.

The framework traces the TVET and NCV policy developments as the foundation of the problem under study. The study looks at "*How the NCV policy supports integration of sustainable development into Primary Agriculture Curriculum?"* These policy frameworks were explored to understand the policy position on inclusion of sustainable development aspects in the Primary Agriculture Curriculum. The existing policy directive would have implications on the extent of integration of sustainable development imperatives in Primary Agriculture Curriculum (Mishler, 1990). The discourse on sustainable development has been steadily creeping into educational policies as a central global concern (Dodds, 2000). Therefore, probing the policy frameworks for possible directives that enable the inclusion of sustainable development issues in TVET is central to this study.

Globally, UNESCO is supportive of educational policies that promote inclusion of sustainable development in all disciplines at every level of society. It was crucial for this study to investigate how educational policies channel training programmes towards imparting sustainable development knowledge required to increase awareness, understanding and support for sustainable development (Lasonen, 2010, p. 142). UNESCO acknowledges sustainability skills as a critical gap in building green economies and sustainable societies. Fundamental to addressing sustainability skills gap is the presence of supportive educational policy directives enabling training programmes to improve sustainability approaches and practices (UNESCO-UNEVOC, 2017).

Flowing from TVET and NCV policies are the NCV programmes which are framed and structured to respond to policy mandates, which in this instance is the need to respond to the existing and emerging societal and labour-market demands. For NCV programmes to respond to sustainable development imperatives as one of the greatest challenges facing humanity today would require a responsive and stabilizing policy direction (Etim, 2012). The conceptual framework identifies the Primary Agriculture Curriculum as concrete area to investigate for content that can be used to teach sustainable development knowledge, skills and values. The Primary Agriculture Curriculum plays a significant role in preparing farmers, researchers, educators, extension staff and members of agri-businesses to make sustainable contributions towards improved food security, production needs and

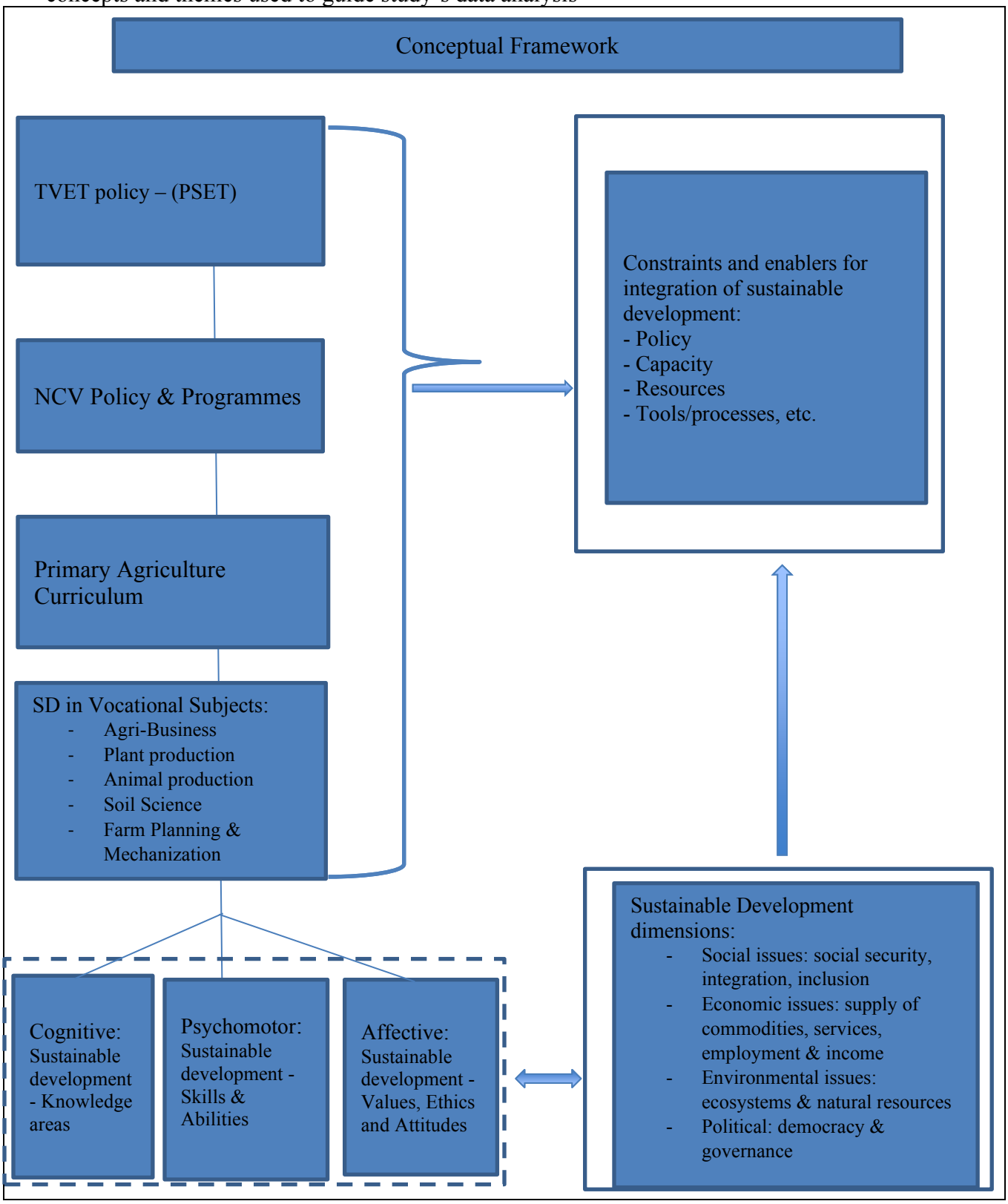
employment demands of the agricultural sector (Chittoor & Mishra, 2012). Investigating the inclusion of sustainable development issues in Primary Agriculture Curriculum is prompted by the need to address ecological degradation and respond to changing technical knowledge in agriculture. This investigation is necessary to ensure that Primary Agriculture Curriculum does not only focus on specific agricultural technical knowledge which quickly becomes obsolete but also include sustainability knowledge, practices and values required to think and resolve environmental challenges emanating from agricultural practices (Chittoor & Mishra, 2012).

The conceptual Framework recognizes technical and vocational subjects offered under Primary Agriculture Curriculum as knowledge fields wherein inclusion of sustainable development issues can take both theoretical and practical effect in the NCV programmes. The Primary Agriculture Curriculum comprises the following subject areas: Agri-Business, Animal Production, Plant Production, Soil Science and Farm Planning and Mechanization (DoE, 2011). The study examines if sustainable development has been materially articulated in the content areas contained in the technical and vocational subjects. UNESCO favours inclusion of sustainable development in TVET programmes to impart knowledge, skills, attitudes, and values needed by students to understand and respond to the ecological problems of the world, thus supporting sustainable and resource-efficient agriculture and economies (UNESCO-UNEVOC, 2017).

The conceptual framework demonstrates that theoretical and practical articulation of sustainable development dimensions comprising environmental, social, economic and political must be inspected in the cognitive, practical and aesthetic outcomes of agricultural training (Pavlova, 2009). The inclusion of sustainable development is reflected in balanced expression of social, environmental and economic objectives in the curriculum (Berke & Kartez, 1995). A balanced articulation of social, environmental and economic objectives in the Primary Agriculture Curriculum will provide skills, tools and resources needed to address the destructive ecological problems such as deforestation, climate change, and loss of biodiversity emanating from agricultural practices (Jabareen, 2008).

Finally, the conceptual framework guided the study in examining probable enablers and constraints for integration of sustainable development across the TVET/NCV conceptual policy foundations and implementation of NCV Primary Agriculture Curriculum. Critical to the success or failure of the inclusion of sustainable development issues into the Primary Agriculture qualification is the presence of enablers and/or constraints experienced at both systemic and institutional levels. Below, refer to Table 2 (page 42) illustrating the conceptual framework outlining main ideas, concepts and themes used to guide data analysis.

Table 2: The diagram below represents the conceptual framework outlining main ideas, concepts and themes used to guide study's data analysis



2.14. Conclusion

The history of TVET shows that TVET originated from the need to prepare young people for work and that has remained the main purpose of TVET. However, the world of work has been changing due new demands which TVET has to respond to. The adage goes that if TVET exists to prepare the workforce for industries, when industries change the TVET must change too. Whilst the purpose of TVET remains to train youth for employment, the knowledge and values that underpin performance of work have changed. That poses a challenge for TVET to align the skilling of youth with the underpinning knowledge. With the emergence of sustainable development as a world framework for development, industries that absorb graduates from TVET are beginning to reconfigure their production processes to infuse sustainability practices. This means that TVET must rethink their skills programmes to meet the new demands for skills from industries and societies. With the growth of sustainable development, new trends have emerged such as the green economy, SDGs and 4th industrial revolution, thereby growing the demand for new skills, knowledge and values in the area of sustainability.

Therefore, in all production sectors like agriculture, there is a growing demand for sustainability skills. Agriculture, as indicated above, is both a high polluter of the environment and is also highly vulnerable to changing environmental conditions as it is solely dependent on natural resources. The need for sustainability skills in agriculture is even higher compared to other production sectors. Agriculture plays a critical role in economies of developing nations like South Africa, where it remains the lifeblood for the economy. Agriculture is a high priority in helping developing economies address their socio-economic challenges such unemployment, poverty and food insecurity. There is a growing need to shift farming practices towards sustainable farming, hence the need for knowledge, skills and values underpinned by sustainable development. This occasioned this study to investigate the integration of sustainable development into Primary Agriculture Curriculum in order to establish the major drivers for sustainability skills in Agriculture.

CHAPTER THREE: RESEARCH METHODOLOGY AND DESIGN

3.1. Introduction

This chapter introduces the research design and methodology used to conduct this Study. The study investigates the integration of environmental and sustainability content into the National Certificate Vocational (NCV) Primary Agriculture Level 3-4 curriculum in the South African TVET system. Due to the study's qualitative nature, a qualitative research approach was used to conduct this study.

The data collected for this study included both verbal and written data. Semi-structured interviews were used to gather verbal data from officials at DHET and lecturers at TVET colleges. Written data was collected through questionnaires administered through e-mails and document analysis of policy documents and curriculum guideline documents.

The qualitative data analysis for this study involved description and interpretation of verbal and written data. Content analysis was used to assess data gathered from interviews, questionnaires, policy documents and curriculum guideline documents.

3.2. Research Approach

This research followed a qualitative research approach.

According to Garbers (1996) a qualitative approach is used to develop models that assist in deepening understanding of concepts and phenomena under study. In this study a qualitative approach was followed as the study seeks to develop a practicable context to guide inclusion of sustainable development into Primary Agriculture Curriculum aimed at promoting development of sustainable skills. The development of practicable contexts for inclusion of sustainable development in TVET was informed by detailed qualitative data gathered from practitioners across the various levels of the TVET system.

A qualitative research approach was applied to strengthen analysis of real issues under specific contexts (Flick, 2009). The agricultural activities affect people's lives and the biophysical environment in various ways, therefore there are growing concerns about

issues of sustainable development in the agriculture sector. The sustainability concerns originating from agriculture have become a serious research and educational agenda. Flick (2009) states that a qualitative research examines people's expressions and activities under particular circumstances. Through this study, views, thoughts and opinions of main practitioners in the TVET system were solicited regarding activities related to inclusion of sustainable development content into the Primary Agriculture Curriculum. Practitioners' views and insights were important to this study for clarifying how the TVET system has responded to the need for sustainability skills required to address the sustainability challenges in the agriculture sector.

The curriculum is a powerful tool used to respond to the issues of societal concern. Hence, the study explored thoughts, insights and views of the practitioners in the TVET system on how sustainable development can be integrated into Primary Agriculture Curriculum to support development of sustainability skills. Furthermore, the study sought to clarify major drivers and factors that inform and influence practice in agricultural education and training regarding its role in enhancing knowledge and understanding of sustainable development issues, development of sustainability skills, and competences and building of values and ethics agreeable to sustainable development (Flick, 2009).

A qualitative approach promotes understanding of human conditions by elucidating human behaviours and experiences (Weinreich, 2009). A qualitative approach gives a voice to subjects under study. It divulges direct information and lived experiences on issues relating to the subject under study. It is underpinned by relationships between the researcher and respondents rather than results of the study. Accordingly, the study actively engaged the relevant and main practitioners in the TVET sector to solicit views, opinions, concerns and insights on issues relating to the integration of sustainable development into the Primary Agriculture curriculum (Worthen and Sanders, 1987).

3.3. Research Design

This study's research design shows the plan and process followed in generating data on the subject matter under investigation (Leedy, 1997). The plan explains how research

participants and institutions were selected as key informants and justifies their inclusion in the study. It is critically important that a research clearly outline procedures followed in gathering data to answer the research questions. A detailed step by step and everything done to generate data including target population, sample, data collected, analyzed and explained is outlined below. In a research aimed at informing and shaping practice, it is important to note that the means justifies the end, therefore, the crucial phases of a research project must be outlined and followed in order to produce credible findings (MacMillan & Schumacher, 2001).

The study investigated the integration of sustainable development content into the Primary Agriculture Curriculum level 3 to 4 at TVET colleges. Therefore, it was very important to critically engage with the main actors in the TVET system, namely lecturers and officials overseeing implementation of Primary Agriculture Curriculum, as well as interrogating the establishment documents. As a researcher, I deliberately selected the DHET and TVET colleges as the main institutions responsible for the implementation of the NCV Primary Agriculture Curriculum. These are the most relevant places to generate data required to inform and shape proposals on future practices for building sustainable development skills through the Primary Agriculture Curriculum. These institutions are responsible for development and implementation of the policy and curriculum in the TVET sector. In the design of this study I selected to focus on lecturers because they are key mediators of the curriculum and their comprehension of sustainable development aspects is critical for transmission of such knowledge, skills and values to students. Thus, due to the scope of this study, I was unable to extend the research to interview students.

3.4 Selection of the Sample

According to Scott and Morrison (2005, p. 219), a sample refers to choosing a smaller group for the study from a larger group. The sample is used to make an approximation about the larger group. As stated above, the TVET institutions were the most relevant sources of data for this study to be executed. There are 50 TVET colleges with multi-campuses spread across the country. Upon investigation on how these 50 TVET colleges function and their academic programmes, I discovered that there were only 13 TVET

colleges that were currently offering the Primary Agriculture qualification. Thereafter, the study concentrated on these 13 TVET colleges. Nieuwenhuis (2007) emphasizes that sampling is crucial in a study because it is impossible to include everyone due to time and cost restrictions. The 13 TVET colleges are also spread across the country, with multi-campuses. Due to time and cost implications of traveling to all 13 TVET colleges, I decided to select 5 TVET colleges for interviews, considering their geographical spread and locality (rural, urban and peri-urban), in order to generate data from different setups and contexts. The 5 TVET lecturers interviewed were representative of the 5 vocational subject fields in the programme, namely Agri-Business, Animal Production, Plant Production, Advanced Plant Production, Soil Science and Farm Planning and Mechanization. These lecturers were selected in consultation with Heads of Department responsible for Primary Agriculture Curriculum at colleges. The 5 TVET colleges were selected from Gauteng, North West, Kwazulu-Natal, Limpopo and Mpumalanga provinces, one from each province. Additionally, questionnaires were sent to all the 13 colleges as there were no cost implications and were administered through emails. The questionnaires were used to generate additional data to supplement interviews.

There were two officials from the DHET that were included in the study sample for interviews. These two DHET officials qualified for inclusion in the study for being the only two officials at systemic level responsible for TVET curriculum development and support in the area under study (Agriculture). The two officials from the DHET included in the study sample were middle managers from the Planning, Policy and Strategy Branch. On consultation with DHET, I was made aware that these two officials were responsible for Curriculum Development and Support, which included the area under study, i.e. the Primary Agriculture Curriculum. Approval to interview TVET lecturers and DHET officials as well as collecting data from TVET colleges through questionnaires was granted by the Deputy Director General: Planning, Policy and Strategy at the Department of Higher Education and Training (refer to letters from DHET on Appendix 5 and 6).

In deciding on the sample, it was very important to set clear boundaries on who should be included or excluded in the study in order to expedite access to the most relevant sources

of data required for this study (Nieuwenhuis, 2007). As the study examines the integration of sustainable development into NCV Primary Agriculture qualification, key practitioners in the TVET system, namely DHET officials and TVET lecturers were included in the sample for their knowledge, insights and experience on TVET policy and curriculum implementation (Flick, 2009). Table 3 below details the criteria and motivation for inclusion in the study sample

Table 3: The criteria and motivation for inclusion in the study sample for data collection

Category	**Criteria for inclusion in Sample**	**Motivation for inclusion in Sample**	**Size of Sample**
1. Policy and curriculum design	• Knowledge and experience on TVET policy implementation • Knowledge of NCV policy and programmes • Curriculum knowledge including content, concepts and themes	• To provide insights on TVET policy (PSET) and NCV policy mandate • To provide insight on DHET strategic direction for NCV programmes and Primary Agriculture Curriculum. • To explain intent, purpose and outcomes of the Primary Agriculture Curriculum • To clarify rationale on Primary Agriculture content areas	2 DHET officials at national office responsible for TVET Curriculum Development and Support were interviewed.
2. College lecturers	• Knowledge and experience in curriculum interpretation and implementation	• To share experience on implementation of NCV Primary Agriculture Curriculum at college level. • To share insights, views, knowledge and understanding of Primary Agriculture content areas taught • To share knowledge and experience on college contextual issues • To clarify theoretical and practical aspect of Primary Agriculture Curriculum	5 lecturers were selected for in-depth face to face interviews (selected from 5 different TVET colleges) Additional 17 lecturers from the TVET colleges responded to questionnaire
• **Total Number of Participants**			**24**

Table 3 above shows how respondents to the semi-structured interviews and questionnaire were purposely selected for the study sample in order to collect most appropriate data. Purposively selecting specific respondents ensured that richest possible and most relevant data required to answer the research questions was gathered (Nieuwenhuis, 2007). These respondents were deliberately selected to source data that will assist in realizing study objective *"To identify gaps and opportunities for integration of sustainable development in Primary Agriculture curriculum"*.

3.5 Data Collection

The study required the collection of both verbal and written data. The verbal data collected for this study was supplemented by written data gathered through questionnaires and other sources. Data collection must search for all sources including written materials that may shed light on the problem under study (Nieuwenhuis, 2007). The other sources of written data included document analysis of policy documents (White Paper for Post-School Education and Training and National Policy Regarding Further Education and Training Programmes) and NCV subject guidelines and assessment guidelines for all the eight technical and vocational subjects offered under Primary Agriculture Curriculum at NQF level 3-4.

Collecting verbal data is one of the major methodological approaches in qualitative research (Flick, 2009). Interview data was generated through semi-structured interviews conducted with DHET officials and lecturers at TVET colleges. The lecturers at TVET colleges were interviewed on their knowledge, understanding and experience in interpretation and implementation of NCV curriculum policy statements, subject guidelines and assessment guidelines at college level. Their views, insights and thoughts were critical for determination of the status of the integration of sustainable development content into the Primary Agriculture Curriculum. The officials of the DHET provided insights on curriculum development and support provided to TVET colleges. Their views were sourced to identify policy positions that are either enabling or constraining the inclusion of sustainable development issues in TVET/NCV curriculum and programmes.

3.6 Semi-structured Interviews Schedules

The semi-structured interviews were used to collect verbal data from practitioners in the TVET sector. The semi-structured interviews were directed at participants who provided relevant knowledge, insights and experience on thematic issues relating to integration of sustainable development content into Primary Agriculture Curriculum offered by TVET colleges. The 5 TVET lecturers and 2 DHET officials were considered for semi-structured interviews. The semi-structured interviews were preferred for this study given the broad nature of the thematic areas covered, namely TVET, agriculture and sustainable development. The semi-structured interviews allow for open-ended questions where a central question asked can be followed up with supplementary questions or be probed further (Jamshed, 2014).

The semi-structured interviews afforded me opportunities to further probe insights, opinions and views shared by the interviewees in order to gather well informed data which will influence and shape proposals to support integration of sustainable development into the NCV policy processes and curriculum content (Gray, 2014). The semi-structured interviews schedules were administered through face to face interviews and questionnaires administered through e-mails (De Jonckheere & Vaughn, 2019).

3.6.1 Face to face semi-structured Interviews

The face to face semi-structured interviews were conducted with two officials from the DHET and five lecturers at the five different TVET colleges. During the face to face interviews, interviewees were asked a set of pre-planned questions. The semi-structured interviews used to gather verbal data allow for data confirmation from other written sources, i.e. journals, policy documents and curriculum guideline documents, etc. (Nieuwenhuis, 2007).

Table 4: The interview schedules used to structure data analysis

Data Source	Code	Sample
DHET Officials	01	Official 1
	02	Official 2
TVET Lecturers	L1	Lecturer 1
	L2	Lecturer 2
	L3	Lecturer 3

	L4	Lecturer 4
	L5	Lecturer 5

3.6.2 Questionnaires administered through e-mails

Adams (2015) refers to an interview schedule as data collecting method primarily containing a list of prepared questions used in collecting data relating to a theme under study. A list of predetermined flexible questions was prepared and sent to the 13 TVET colleges who offer the NCV Primary Agriculture qualification. Questionnaires were used to collect data from TVET lecturers who did not form part of the sample for face to face interviews. The rationale for including questionnaires was to collect wider data from as many TVET lecturers as possible and ensure coverage of all vocational subject fields, namely Agri-Business, Animal Science, Plant Production, Advanced Plant Production, Soil Science and Farm Planning and Mechanization.

Table 5: The questionnaire schedules used to structure data analysis

Data Source	Code	Sample
TVET colleges	Q 1	Resp 1
	Q 2	Resp 2
	Q 3	Resp 3
	Q 4	Resp 4
	Q 5	Resp 5
	Q 6	Resp 6
	Q 7	Resp 7
	Q 8	Resp 8
	Q 9	Resp 9
	Q 10	Resp 10
	Q 11	Resp 11
	Q 12	Resp 12
	Q 13	Resp 13
	Q 14	Resp 14
	Q 15	Resp 15
	Q 16	Resp 16
	Q 17	Resp 17

3.7 Document analysis

A qualitative research allows use of document analysis as an alternative data collection method to other methods such as interviews, questionnaires, etc. However, document

analysis in a qualitative research can also be used as a single method (Flick, 2009). Documents are defined as standardized artefacts occurring in specific formats such as journals, notes, case reports, contracts, remarks, annual reports, expert opinions, etc. (Wolff, 2004, p. 284). Scott (1990, p. 6) states that to assess the quality of documents, the researcher should probe authenticity, credibility, representativeness and meaning of documents before deciding to use particular documents. The quality of documents has an effect to the evidence collected and answers sought by the study. Documents represent particular types of realities created for particular motives. Data assembled from documents cannot simply be used to endorse interview statements. Documents are much more than holders of data, rather, they are used to contextualize data (Flick, 2009). Various documents were analyzed to generate more data on the themes under study. The purpose of document analysis is to triangulate (compare and contrast) between primary and secondary data. For this study, the following types of documents were analyzed to determine the extent of sustainable development inclusion in Primary Agriculture Curriculum:

Table 6: Representation of the types data and documents used for document analysis

Type of data	Document types
TVET policy directive and position on sustainable development	White Paper on Post-School Education and Training (2013)
NCV policy directive and position on NCV programmes including Primary Agriculture Curriculum	• Policy for the National Certificate (Vocational): A qualification at Level 3 on NQF (2006) • Policy for the National Certificate (Vocational): A qualification at Level 4 on NQF (2006)
Content areas included in Primary Agriculture Curriculum	Subject Guidelines for: • Agri-Business NQF Level 3 and 4, • Animal Production NQF Level 3 and 4, • Plant Production NQF Level 3, • Advanced Plant Production Level 4, • Soil Science NQF Level 3 and • Farm Planning and Mechanization NQF Level 4.
Assessment practices in Primary Agriculture Curriculum	Assessment Guidelines for: • Agri-Business NQF Level 3 and 4, • Animal Production NQF Level 3 and 4, • Plant Production NQF Level 3,

	• Advanced Plant Production Level 4, • Soil Science NQF Level 3 and • Farm Planning and Mechanization NQF Level 4.

3.8 Data Analysis

Data analysis for this study involved description and interpretation of both verbal and written data gathered through interviews, questionnaires and document analysis. Nieuwenhuis (2007) emphasized that data analysis must be focused on the research topic, research questions and literature reviewed. The description and interpretation created meaning of what is represented in the data (Flick, 2009). The data analysis in this study involved description and interpretation of primary data gathered through face to face interviews conducted with DHET officials and TVET lecturers as well as data generated through questionnaires completed by TVET lecturers. Description and interpretation were also applied to secondary data gathered from written texts such as TVET and NCV policy documents, NCV subject guidelines and NCV assessment guidelines.

The content analysis was applied to examine data in order to identify emerging themes, views and insights from the interview and questionnaire transcripts and written texts. Content analysis assisted in simplifying and enhancing the understanding and interpretation of data. Content analysis was very useful for comparing and contrasting the texts in order to confirm or disapprove the original theoretical statements (Nieuwenhuis, 2007). It was also useful in scrutinizing the policies for TVET/NCV programmes, the Primary Agriculture Curriculum documents (such as subject guidelines and assessment guidelines listed in Table 6 under document analysis), as well as the interview and questionnaire transcripts. Content analysis assisted in inspecting and verifying if the documents listed above had made pronouncements on or included sustainable development knowledge content, concepts, themes, skills, values, principles, attitudes and perspectives.

The Pavlova (2009) framework for a systematic approach to sustainable development curriculum planning was specifically applied to guide content analysis. It was used to verify the inclusion of sustainability content in the curriculum documents, namely subject

guidelines and assessment guidelines (refer to Table 7 summarizing some of agricultural content areas that can be used to teach sustainable development which formed the basis of my analysis). Table 7 shows how the Pavlova (2009) framework was adapted and contextualized to this study. The general data analysis was guided by the conceptual framework in order create a holistic understanding and meaning of the data (refer to Table 2 representing the conceptual framework outlining main ideas, concepts and themes to guide study's data analysis)

3.9 Data Management

The data generated through the semi-structured interviews conducted with two DHET officials and five TVET lecturers were audio-recorded and transcribed. The data gathered through questionnaires administered through e-mails to TVET lecturers were also transcribed. The transcripts and audio recording were archived to preserve the collected data. The audio recording of data assisted in safeguarding against researcher's biasness when writing up, classifying and evaluating data in order to keep the whole research process valid (Flick, 2009). All data collected (verbal and written) for this study was converted into electronic format and archived in pass-word protected files in a personal computer.

3.10 Ethical Considerations

Research has become an issue of ethics. The issue of ethics protects interest of research participants and protects research from scandals on data manipulation. There are codes of ethics that researchers must comply with (Flick, 2009). The codes of ethics sanitize the relations between researchers and participants and the area of study. The code of ethics prevents researchers from compromising participants involved and safeguards their needs and interests. Academic and research institutions have established ethic committees to protect the rights and interests of all participants in the research process. Ethics committees enforce ethical standards as well as inspecting research designs and methods before application. A good ethical practice means that the research complies with ethical codes, research proposal meets ethical soundness and is endorsed by ethics committee (Flick, 2009).

The research proposal for this study was endorsed by the ethics committee at Wits School of Education (**PROTOCOL NUMBER: 2018ECE015M)**. The ethics clearance certificate was issued to the researcher. The researcher signed the ethics clearance certificate to acknowledge and bind himself with the code of ethics. The ethic clearance certificate was shared with parties involved in the study, namely, supervisor, co-supervisor, Department of Higher Education and Training, TVET colleges (management and lecturing staff).

The code of ethics ensures that a research is conducted with informed consensus. The research participants voluntarily agreed to participate upon information provided to them. The researcher has desisted from hurting participants, raiding their privacy or misleading them on the research's objectives (Flick, 2009). Permission was granted by the Deputy Director-General of the Department of Higher Education and Training to conduct the study at the department and TVET colleges. The DHET identified two staff members responsible for Curriculum Development and Support at TVET colleges to assist with interviews. Two letters were issued to the researcher from DHET giving permission to collect data at DHET and TVET colleges. The of 13 TVET colleges that offer the Primary Agriculture Curriculum were approved by the DHET for interviews. The Heads of Department in Primary Agriculture qualification identified lecturers at the five TVET colleges. All participants agreed to participate in the study by signing the consent forms which outlined the details of the study. All information on the study was provided to participants. All interviews were conducted at the interviewees' workplaces after arrangements regarding times and venues were made with the interviewees and their supervisors. The researcher travelled to all workplaces of the participants. Questionnaires were administered through e-mails to Heads of Department for the NCV Primary Agriculture programmes at TVET colleges. The responses to interview schedules questions completed by the respondents were collected from the colleges and some were e-mailed back by respondents to the researcher.

Compliance with code ethics for research was treated as obligatory, indispensable and requirement for this study. The following ethical standards were observed in conducting this study:

- Seeking permission from authorities and participants;
- Assurance to everyone involved that confidentiality or anonymity will be respected;
- Seeking permission from all interviewees to audio-tape the interviews;
- Sticking to agreed times for interviews and respecting their operational hours;
- Being transparent with all information relating to the study.

More importantly, in the write up of findings and discussions of the gathered data, the researcher did not reveal identity of the participants providing verbatim comments but used a coding system.

3.11 Validity and Reliability

It is very important to ensure that the whole research process keeps its reliability and validity. Reliability and validity refer to a research process that is credible and trustworthy (Lincoln & Guba, 1985). Validity involves the accuracy and reliability of description, conclusion, explanation, interpretation, or any other sort of justification made in the study. Nonetheless, validity does not suggest the presence of an unbiased fact to which an interpretation can be compared (Maxwell, 2005, p. 87).

It is generally accepted that engaging multiple methods of data collection, such as observation, interviews, questionnaires and document analyses lead to trustworthiness. Including several investigations or peer researches to help with the interpretation of the data enhances trustworthiness (Nieuwenhuis, 2007, p. 82). In this study, reliability and validity was demonstrated through use of multiple data collection methods and use of varied sources of primary and secondary data as well as use of internal and external supervision. Accordingly, a conceptual framework providing contexts to key ideas and concepts was used for cohesive examination of issues under study to improve validity of the study (Liehr & Smith, 1999). However, validity of research outcomes is not assured by pursuing some set techniques. Validity is not a product to be acquired by merely following certain approaches. Validity depends on the extent to which the findings are connected to the real world. There are no fixed techniques that can guarantee that a researcher has sufficiently comprehended the issues of the world under study (Maxwell, 2005, p. 86). For this study the researcher tried everything humanly possible to guard

against biasness in the description and interpretation of data to ensure that research findings are as close to real world as possible. The literature from credible and peer reviewed texts as well as applicable frameworks from credible scholars were used in the description, analysis and interpretation of data.

Maxwell (2005) cautions researchers against a risk to valid data interpretation through imposing their own view, agenda or meaning. The researcher must consider and understand the perspectives of the people studied and not force researcher's meaning to their words and actions. To promote good practice and ensure credibility and dependability of the study, as a professional practitioner within the environment and sustainability field, the researcher restrained himself from allowing personal interests and biasness towards particular aspects of the research to surface nor allowed preconceived ideas to influence data management and analysis. What is important for the researcher to reduce validity threats is to seriously and systematically understand how participants make sense of what is happening instead of describing their words and actions from the researcher's own framework. It is also more important to highlight that validity in the wider context of trustworthiness or credibility, is an essential concept for all research (Maxwell, 2005).

3.12 Limitations of the study

A limitation of this study was that environment and sustainability content area is a fairly new knowledge field. There was a limitation of peer reviewed and published literature related to inclusion of sustainable development in Primary Agriculture Curriculum in the TVET sector. The environmental and sustainability content is fast changing and ever evolving knowledge field which makes this study more challenging and difficult. Studies on issues relating to environment and sustainable development are viewed as antithesis to conventional development practices that may also impact on the acceptance of the findings and recommendations.

3.13 Conclusion

The study sought to strengthen and deepen understanding on the need to include sustainable development in the TVET curricula in general and the Primary Agriculture Curriculum, in

particular in South Africa. Therefore, a qualitative approach to the study was chosen in order to strengthen analysis of real issues under specific contexts. In this qualitative study, practitioners' expressions and actions in the TVET system were examined in order to shed light on practices regarding inclusion of sustainable in TVET programmes. It was very crucial to undertake a study looking at sustainability issues in Primary Agriculture which plays an important role in peoples' material conditions. In meeting the peoples' material conditions, agriculture as a production sector relies heavily on the natural resources as well as heavily impacting on the reliability of the same natural resources. Hence, a qualitative approach which promotes understanding of human conditions by elucidating human behaviours and experiences was followed. The study aimed to establish what were the major drivers behind integration of sustainable development in the South African Primary Agriculture Curriculum with the purpose of influencing and guiding inclusion of sustainability knowledge, skills and values in agricultural education and training.

CHAPTER FOUR: DATA ANALYSIS

4.1. Introduction

This chapter presents the data analysis of this study on the investigation of the integration of environmental and sustainability content into the NCV Primary Agriculture level 3-4 curriculum offered at TVET colleges. This was a qualitative study which employed descriptive and interpretative methods to analyze the data gathered for this study. The supplementary data gathered from written text such as TVET/NCV policies documents, curriculum documents including subject guidelines and assessment guidelines that were also evaluated through content analysis. The data analyzed in this chapter was gathered through interviews and questionnaires from a total number of twenty-four participants and document analysis as follows:

- Two officials from the DHET were interviewed.
- Five TVET Lecturers were interviewed.
- Seventeen TVET lecturers responded to questionnaires.
- Document analysis of TVET/NCV policy and Primary Agriculture Curriculum documents.

4.2. Systematic approach to sustainable development curriculum planning

The Pavlova (2009) framework for a systematic approach to sustainable development curriculum planning was used to do content analysis verifying inclusion of sustainability content in the curriculum documents such as subject guidelines and assessment guidelines. The Pavlova framework provided guidelines of what content to look for in the technical and vocational subjects constituting the Primary Agriculture Curriculum and guided the synthesis of key sustainable development concepts, skills and values identified by the respondents to interviews and questionnaires.

The Pavlova (2009) framework guides inclusion of sustainable development in light of the three educational goals, namely the cognitive, practical and aesthetic, described hereafter. The cognitive focus shows themes in Primary Agriculture Curriculum used for acquisition

of knowledge and understanding on sustainable development. The practical focus shows skills and abilities acquired for sustainable practices and aesthetic focus shows adoption of values and ethics amenable to sustainable development (Pavlova, 2009). The Table 7 below shows how the Pavlova 2009 framework was contextualized drawing on literature to enable me to study the Primary Agriculture Curriculum. The Table 7 also helped me in reading the data collected more closely to surface key aspects of sustainability in the Primary Agriculture Curriculum across the vocational subjects.

Table 7: Summary of some of agricultural content areas that can be used to teach sustainable development which formed the basis of my analysis.

Vocational subject	**Cognitive themes**	**Practical**	**Aesthetic/ Affective**	**Sustainable Development**
Plant Production	Agroforestry	**Possible skills:** Design skills Mixed farming Forest management Soil fertility Soil erosion reduction Intercropping Floods prevention, etc.	**Possible values/ethics** Appreciation of natural systems Environmental conservation Natural resources conservation	**Social:** Interdependencies Health/medicinal plants Stakeholder involvement **Environment:** Reduces deforestation Increased biodiversity Reduces atmospheric CO_2 concertation **Economic:** Food security Job opportunities (job creation) high value products
Animal Production	Rotational grazing	**Possible skills:**	**Possible values/ethics**	**Social:** Animal welfare/rights

		Demarcation of camps, Measurements of carrying capacity of camps, Animal management skills, Animal assessment skills, Pasture management skills	Conservation ethics Maximum pasture growth and productivity Increased forage production Soil fertility Drought resistance Increased utilization of the land	**Environment:** Carrying capacity Reduced/controlled greenhouse gas emissions Reduced land degradation Reduced soil erosion **Economic** Savings from supplementary feeding High value animals (products)
Soil Science	Organic fertilizers	**Possible skills:** Composting Mulching Local resources management skills Organic farming, Cover cropping Vermicomposting Crop rotation	**Possible values/ethics** Values to recycle, re-use and reduce Improved quality of life Environmental conservation Reduced Drought sensitivity Reduced pest infestation Reduced yield failure	**Social:** Health benefits/organic food New partnerships **Environment:** Reduce waste Local resources utilization **Economic:** Earthworm business Market access Food security Returns stability High income- high

				demand for organic products Cost effectiveness Poverty alleviation Better quality products
Agri-Business	Sustainability	**Possible skills:** Complementarity Problem solving Sustainability goals	**Possible values/ethics** Values to balance productivity & conservation Increased economic growth	**Social:** Ownership Legal issues Human consideration in business
				Environment: Long-term Increased biodiversity
				Economic: Profit Quality produce Food security Sufficient quantity production
Farm Planning and Mechanization	Natural resources/ sustainable farming system.	**Possible Skills:** Conservation of natural resources Land use planning Balance sustainability, productivity and the conservation	**Possible Values/Ethics:** Appreciation of natural resources	**Social:** Human resources as part of farming system
				Environment: Natural resources: water, soils climate, vegetation, topography

		Systems thinking		**Economic:** Sustainable farming enterprises

4.3. Analysis of data collected from two officials at the DHET

4.3.1 Educational background and work experience

During the course of the interviews it was necessary to establish the academic credentials and work experience of the two officials. The rationale was to make a determination on the prior knowledge and experience of the two officials to oversee implementation of the Primary Agriculture Curriculum. However, during the interviews it transpired that this issue was inconsequential as the positions occupied by these two officials did not necessarily require qualifications and experience in agriculture but facilitation and coordination skills for the support required by colleges. Moreover, the support provided to the colleges by these two officials was not subject specific and what was required from these officials was the ability to liaise with subject experts on the support required by colleges. Official 1 responded that the position required one to understand the NCV policy as the guiding framework on implementation of NCV qualifications. The responsibility of the position was to ensure that TVET colleges were supported on assessment and moderation practices across the curricula.

4.3.2 Knowledge and understanding of what sustainable development

The work responsibilities for Official 1 and 2 were curriculum development and support for the colleges. In the context of UN adopting sustainable development as a global framework for development, officials' knowledge and understanding of sustainable development is critical. Hence knowledge and understanding of sustainable development of Official 1 and 2 were essential because their work responsibility entailed curriculum development and support at TVET.

In reviewing the understanding of sustainable development, Official 1 could not talk directly to what sustainable development was but was able to credit the country's economic development to agriculture. Official 1 underscored the obligatory role of TVET to develop

skills and human resources for the agricultural sector. The official indicated that there is an NCV policy directive for all colleges offering agricultural programmes to have a farm for sustainability learning because he viewed sustainable agriculture as something that can be learnt through practices.

Official 2 mentioned that she learnt about sustainable development through her involvement in the sustainable tourism programme. This official was able to link issues discussed under sustainable tourism such as waste management, water saving, and recycling to sustainable development. Official 2's view was that at college level there was still a lot on sustainable development aspects that have not yet been included in TVET curricula. She raised the inclusion of sustainable development as a serious curriculum gap in the TVET system. Official 2 argued that colleges were prevented by lack of capacity, resources and facilities to include sustainable development into TVET programmes.

The views and insights shared by Official 1 and 2 above revealed that there was some general awareness of sustainable development among the officials. However, the practical experience and knowledge of how it can be integrated into TVET was still a serious curriculum gap. However, the understandings of sustainable development raised did not reflect a nuanced understanding, so it was not possible to elicit the different elements of sustainable development. A lack of a nuanced understanding at DHET level is a serious knowledge gap that can lead to the exclusion of sustainable development in TVET.

4.3.3 Integration of sustainable development into Primary Agriculture Curriculum

This section highlights officials' views and insights on the integration of sustainable development into Primary Agriculture Curriculum. The data revealed that officials made links between the integration of sustainability and continuous food production.

Official 1 associated the need to integrate sustainable development into Primary Agriculture Curriculum with emerging global trends such as transitioning to green economies, the SDGs and 4th industrial revolution. He argued that these trends demanded that agricultural practices must adapt to these trends to remain relevant. He argued that as

long as agriculture was the foundation for the country's economic development, sustainable development must be integrated into the Primary Agriculture Curriculum.

Official 2 highlighted that sustainable development seemed to be a trajectory where every economic activity is headed. This official illustrated how the tourism sector had started to factor in environmental considerations in repositioning itself towards sustainable tourism. The official mentioned that there was an acknowledgement in the hospitality and tourism industry that, for the industry to be economically viable, it must be built with due consideration of environmental limits on the sector as one of the major consumers of natural resources. Therefore, the drive towards sustainable tourism must be supported by qualifications/skills programmes at TVET underpinned by sustainable development.

Upon reflecting on the different elements of sustainable development that should be integrated, Official 1 pointed out that the Primary Agriculture Curriculum contained sustainable development issues such as medicinal plants, insecticides or pesticides, indigenous knowledge and global perspectives on agricultural technologies. He confirmed that the Primary Agriculture qualification was in high demand and the curriculum was on course towards meeting the departmental goal of developing small-scale farmers. Official 2 mentioned water issues as fundamental to industrial development. She said industries were inventing new means to address their water demand issues and that TVET colleges must catch up with industry demands for vocational skills. She explained how water saving was a serious issue in the hotel industry where some hotels used water saving cooking such as steam/dry cooking, grills and braais. She also mentioned issues such as such as permaculture, water conservation and waste management which could be used to teach sustainable development in the Primary Agriculture Curriculum.

The elements of sustainable development that the two officials highlighted as important to be integrated reflected the cognitive, practical and aesthetic aspects of the adapted Pavlova (2009) framework. For example, the water issue raised above can be used in cognitive learning to enrich understanding of sustainability and build skills such as steam cooking and grilling food that would foster water saving values and ethics.

4.3.4 TVET/NCV policy directives on sustainable development

One of the key sub-research questions is to establish *"How does the NCV policy support integration of sustainable development into Primary Agriculture Curriculum?* Official 1 stated that DHET policies and strategic objectives were informed by the Constitution and NDP which both recommended a sustainable development path. He said that DHET policies such as White Paper on Post-Schooling Education and Training (PSET) and NCV policy positioned TVET to build skills responding to the country's development agenda. Sustainable development has been adopted as a guiding principle for the country's development agenda. However, the TVET/NCV policy does not openly give a directive on inclusion of sustainable development.

Furthermore, Official 1 mentioned that through policy (PSET, 2013) the TVET sector was mandated to build skills responding to key government priorities which include agricultural development. The NCV policy (2006) directs Primary Agriculture Curriculum to develop skills and human resources responding to development needs of their surrounding areas. He claimed that the PSET policy directed the TVET towards sustainable development, although, sustainable development did not seem to have filtered down to college level, which raised issues of policy implementation.

Official 1 indicated that TVET colleges were instructed to offer ministerially funded priority programmes. He said that TVET programmes were required to develop qualifications responding to socio-economic issues in their surrounding areas. Through these ministerially funded programmes, the colleges were expected to do a labour-market intelligence study to establish which skills and human resource were needed in their geographic areas. According to Official 1, sustainability in the TVET context meant responding to the socio-economic needs of their surrounding areas. He maintained that when delivering on relevant qualifications the colleges must first understand skills needs in their geographic areas. In his view, for the college qualifications to be sustainable, the colleges must deliver qualifications according to the demands of their geographic areas.

Both Official 1 and 2 confirmed that when qualifications were developed the DHET consulted with the stakeholders from the different sectors of the society to source inputs on the kinds of skills that the TVET qualifications should deliver. The DHET has established curriculum support teams for TVET colleges comprising subject experts where these experts make inputs on TVET curricula to ensure that curricula were updated and address current issues. As much as DHET supports colleges on curricular issues, colleges enjoyed a certain level of autonomy on curriculum matters. The role of DHET was only to advise on curriculum issues but colleges decided on what was good for their colleges and their geographical, socio-economic and socio-ecological contexts.

Official 1 stated that college councils were tasked with responsibility to decide which issues must be included in their college curricula in light of government priority areas. He claimed that these government priorities included issues such as green economy, SDGs and 4th industrial revolution which made it unavoidable for colleges to disregard sustainable development. However, not all colleges offered Primary Agriculture qualification and those who did so were responding to skills demands in their surrounding areas. For the colleges, financial sustainability was very critical, therefore producing skills according to demands in their localities was a way for the colleges to sustain themselves. In addition, Official 2 reasoned that industries that employed college graduates had already started to consider sustainable practices in their production processes, therefore colleges should start producing skills that were going to match and meet these industrial skills needs.

However, neither Official 1 nor 2 were conclusively able to articulate whether there was a clear directive flowing from a specific policy guiding colleges to develop sustainable development skills. But, as a consequence of DHET mandate flowing from the Constitution and NDP, they believed that TVET colleges were expected to deliver on sustainability skills.

4.3.5 Formal guidelines, tools and processes to support integration of sustainable development in TVET

Both Official 1 and 2 accepted that sustainable development was a new knowledge field to the majority of practitioners in the TVET system. Given that sustainable development was a cross-curricular theme made it more complex to integrate sustainable development in curricula. Both officials confirmed having no knowledge of specific guidelines, tools and processes at national or provincial level supporting the integration of sustainable development into college curricula. Official 1 remembered that the only guideline ever produced was a manual on Greening of TVET Colleges that was sponsored by a German Non-Governmental Organization called Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ). However, the guide (GIZ, 2014) had a focus on general institutional sustainability planning and was not uniquely focused on curriculum. This donor funded initiative, however, only benefitted a few colleges and could not be extended to other colleges nor sustained due to financial constraints.

Official 2 pointed out that there were other government departments which ran programmes on sustainable development. For example, the Department of Tourism ran a programme on coastal and marine management which focused on sustainable development issues. If TVET graduates were placed in such programmes for work integrated learning they could get exposure to sustainability issues. Therefore, through collaborations with other government departments or industries, the TVET colleges could expose students to sustainability practices.

The data thus highlighted that there were no known resource guidelines or educational tools at DHET level driving the integration of sustainable development into TVET curricula. This is a serious restraining factor to the integration of sustainable development into Primary Agriculture curriculum.

4.3.6 Constraints experienced with integration of sustainable development into TVET

This section highlights the constraints to the integration of sustainable development that emerged from the interview data. Funding emerged as a key constraint that restrained TVET colleges from implementing new initiatives. Official 1 indicated that on many occasions TVET colleges may want to introduce something new into their programmes but they were usually hamstrung by lack of finances, although this issue was a college per college issue. One example in particular was the Greening of TVET Colleges initiative mentioned above which was donor funded and when the funding dried up the initiative could not be sustained due to lack of funding.

Another constraint that was raised was the educational background and experience of lecturers. Official 1, given his teaching background, raised the issue of many college lecturers who did not have a professional teaching methodology or pedagogy background. Such lecturers may lack capacity to integrate sustainable development into their lessons. In an ideal situation, a TVET lecturer must hold suitable academic education qualification such as the Post-Graduate Certificate in Education (PGCE).

Sustainability, as a new knowledge field, was also raised as constraint. Official 1 and 2 raised the challenge of sustainable development being a fairly new content area and that many lecturers had not gone through any training or workshop on sustainable development. The colleges, thereby require a coherent and focused process for supporting uptake of sustainable development in their technical and vocational training courses.

A further constraint mentioned was infrastructure challenges experienced at most TVET colleges. Official 1 stated that facilities at most colleges were outdated and lacked the relevance to accommodate sustainable development practices. It was only newly built colleges that had infrastructure that related to issues of sustainability. For example, a TVET College in Limpopo had buildings designed to harness natural light and the design of glasses installed gave due consideration to energy saving and promoted the use of natural sunlight. Installation of modern infrastructure can also be used to demonstrate sustainable

practices such as the use of renewable energy, energy efficiency and water harvesting. Data reveals a good grasp of issues at TVET colleges that may constrain inclusion of sustainable development in the Primary Agriculture Curriculum.

4.4. In-depth semi-structured interview conducted with TVET lecturers

4.4.1 Academic qualifications and work experience of the interviewees

The study engaged with the TVET lecturers/respondents on their academic qualifications and work experience with the aim of establishing their capacity and suitability to teach at TVET college level. The academic qualifications and work experience of the lecturers may influence their ability to integrate sustainable development in the Primary Agriculture lessons. All respondents to semi-structured interviews held academic qualifications in agriculture and met the basic requirements to teach at TVET colleges. The academic qualifications achieved by the respondents were obtained at three different levels of higher education and training institutions, namely agricultural colleges, universities of technology and formal universities as shown in Table 8 below.

Table 8: Academic qualifications of lecturers interviewed at TVET colleges

Code	**Qualification**
Lecturer 1	National Diploma, Bachelor of Technology and PGCE
Lecturer 2	Bachelor' Degree in Agriculture
Lecturer 3	National Diploma
Lecturer 4	Diploma in Agriculture
Lecturer 5	National Diploma and PGCE

The above table (Table 8) reveals that despite all lecturers meeting minimum requirements to teach at TVET colleges, only two were professionally qualified educators because they had completed a professional teaching methodology course, that is the Post Graduate Certificate in Education (PGCE).

Table 9: Work experience of lecturers and industry where work experience was acquired

Code	Work Experience	Industry prior TVET
Lecturer 1	Over 5	Extension Officer and Agricultural Science Teacher
Lecturer 2	Over 10	Volunteer at Department of Agriculture
Lecturer 3	Over 10	Farm manager
Lecturer 4	Over 5	Abattoirs
Lecturer 5	Over 5	Agricultural Science Teacher

Table 9 above reveals that two lecturers indicated work experience spanning more than 10 years and the other three lecturers indicated work experience of over 5 years. The lecturers mentioned work experiences acquired in agricultural related workplaces prior to joining TVET such as being an Agricultural Science Teacher, working in Abattoirs, working as a Farm Manager, working as an Agricultural Extension Officer and working as a Volunteer in the Department of Agriculture. This data thus indicates that all five respondents had five or more years' experience working in agricultural contexts.

4.4.2 Knowledge and understanding of sustainable development by TVET lecturers

All five lecturers interviewed showed an awareness that the existing Primary Agriculture Curriculum contained content areas that could be used to teach sustainable development. Lecturer 1 said that Primary Agriculture was conceptualized to train small-scale farmers, especially those who have who had limited access to land due to past land deprivations. Therefore, sustainable development issues are critical to success small-scale farmers who experience land deprivations.

The respondents were able to describe sustainable development scenarios within the Primary Agriculture context in different ways, these are captured in the Table 9 below and reflect that lecturers had a reasonable understanding of the associations between agriculture and natural resources for continuous production of agricultural products.

Table 10: The lecturers' perspectives on sustainable development as follows:

Code	Lecturers perspective on sustainable development as reflected within the Primary Agriculture Curriculum
Lecturer 1	Sustainable development is a way through which the country will be able to meet its needs for agricultural products in way that guarantees continuous supply of agricultural goods and services.
Lecturer 2	Sustainable development in farming refers to farming methods that will not compromise the quality of environmental resources. Current generations must preserve environmental resources for the benefit of future generations. It is all about farming in a way that does not have damaging effects on the balance of the ecosystem.
Lecturer 3	Sustainable development in Primary Agriculture must be about taking care of natural resources so that even the future generations will be able to enjoy the benefits from same natural resources. Everyone involved in agricultural enterprises should prioritize the need to conserve nature. Farming requires people who love nature.
Lecturer 4	The Agri-Business course has a section that deals with sustainability. Sustainability ensures that future generations will continue to derive the same benefits from natural resources. The section addresses issues relating to taking care of natural resources. The section addresses sustainability from social, economic, environmental and political perspectives to ensure that farming becomes a viable enterprise.
Lecturer 5	In addition to creating environmentally sound farming enterprises, sustainability also deals with human capital issues by promoting farmers' welfare and earning a decent living. Political sustainability ensures that farming enterprises comply with rules and regulations, e.g. sustainable farming enterprise will comply with the set minimum wage.

When prompted to supply the key concepts relating to sustainable development as a reflection of their general understanding of sustainable development, the lecturers were able to name ecological concepts as reflected in the Table 11 below.

Table 11: Synthesis of key ecological concepts retrieved from interviews with TVET lecturers:

Environmental theme	**Ecological concepts identified by lecturers**
Climate Change	Global warming, weather patterns, floods, droughts, extreme temperatures.
Water	Drip irrigation, irrigation systems.
Food	Food security, food gardens, organic gardens, methods of production, tunnel farming.
Ecology	Rotational crops, intercropping.
Natural resources	Reduce land/space usage, mulching.

Waste and pollution	Pesticides, avoid pollution.
Environment	Damage to the environment, preservation of the environmental resources.

From the above synthesis of key concepts identified by the lecturers, the lecturers were able to identify ecological concepts that can be used for cognitive learning in Primary Agriculture to increase knowledge and understanding of sustainable development. However, the responses from lecturers did not show understanding of the link between ecological concepts and specific skills and values and ethics underpinning sustainable development. Although data revealed that the lecturers could identify ecological concepts, the discussion did not show a flow from cognitive to psychomotor to affective. It was also not easy for the lecturers to delve deep into the social and economic aspects of ecological concepts, although, their responses were only very clear on environmental aspects. While my personal observation from the responses of lecturers revealed that despite the lack of ability to link or show how cognitive, practical and aesthetic aspects relate to each other and the dimensions of sustainability, I must state that a few isolated snippets of practical and aesthetic aspects as well as social and economic issues did unintentionally emerge in their responses.

The lecturers' views and insights on sustainable development in the light of the broader NDP context were solicited to assess how significantly the lecturers regarded sustainable development. If the lecturers regard sustainable development as significant, there was a high probability that they might include sustainability learning in their lessons. Lecturer 1 responded that sustainable development must be a priority in government development plans to reduce environmental degradation. Lecturer 2 talked about the importance of natural resources from the environment that are used to produce food and that if people looked after natural resources, food production will be sustainable. Lecture 3 agreed that sustainable development should be a priority in the NDP. He made reference to the need for the country to address poverty, an issue which he believed did not exist in the past years because people used their indigenous knowledge to produce food and were self-sufficient, unlike now where they expect our government to provide everything for them. Lecturer 4

said that the inclusion of sustainable development in the NDP will drive economic growth without compromising the integrity of the natural systems. Lecturer 5 talked about the need for government to act now because people are already feeling the negative effects of climate change and global warming.

These responses thus demonstrate a reasonable awareness of the cognitive aspects of ecological concepts in Primary Agriculture and the environmental benefits. However, when respondents were probed further, the lecturers could neither articulate nor directly link ecological aspects to the development of specific sustainable development skills, values and ethics required for NDP to ensure that the country continues to derive environmental, social and economic benefits sustainably. In the main, the challenge to the lecturers appears to be lack of ability to articulate how the teaching of existing Primary Agriculture content could lead to development of sustainability skills and values.

4.4.3 How does Primary Agriculture Curriculum contribute to sustainable development?

After the identification of key sustainability concepts in the Primary Agriculture Curriculum, the lecturers were asked on how they see Primary Agriculture contributing towards sustainable development.

All lecturers were able to provide responses detailing how they saw the value of sustainable development within Primary Agriculture. Lecturer 1 responded that the Primary Agriculture Curriculum must enable students to acquire necessary knowledge and skills to improve the sustainability and quality of agricultural products. Lecturer 2 simply stated that the purpose of Primary Agriculture Curriculum is to train small-scale farmers. Lecturer 3 went further to propose that empowering small-scale farmers with skills which must be strengthened with entrepreneurship and cooperatives to promote farming enterprises through agricultural production. Lecturer 4 teaches Agri-Business and was able to illustrate how the subject contained content areas covering sustainable development from social, economic, political and environmental perspectives and was emphatic in claiming that the Primary Agriculture Curriculum contributes towards sustainable development.

This shows that some of lecturers could link agricultural issues to some sustainable development aspects. The responses from most of the lecturers revealed awareness of environmental aspects but did not articulate their link to social and economic aspects of sustainable development.

To divulge lecturers' understandings of how Primary Agriculture can contribute towards sustainable development, the lecturers were asked to identify content areas within the existing curriculum that can be used to teach sustainable development. The lecturers were asked *"Which sustainability concepts, values, principles and perspectives are included in Primary Agriculture Curriculum, textbooks and other study materials?"* All lecturers were able to identify and describe sustainable development concepts in Primary Agriculture Curriculum (refer to Table 12, below).

Table 12: The lecturers listed some sustainable development concepts in Primary Agriculture Curriculum as follows:

Primary Agriculture Curriculum	**Sustainable development concepts**
Plant Production	Biological control of pests, use of chemicals, propagation
Animal Production	Overgrazing, rotational grazing, loss biodiversity
Soil Science	Zero tillage, soil erosion, run-off
Agri-Business	Environmental indicators, demands of the economy, social, political
Farm Planning and Mechanization	Natural resources, farming systems and land use planning

The above data revealed that the lecturers were able to identify some concepts for cognitive learning of sustainable development in the Primary Agriculture Curriculum. However, their enunciation of ecological concepts for cognitive purposes did not show the link to practical and aesthetic purposes. This means that, although Primary Agriculture Curriculum is rich in sustainable development content, the curriculum mainly emphasized the growth of agricultural production without building skills and values for sustainable practice.

In attempting to connect sustainable development discourses to key agricultural concepts, the lecturers were asked to clarify how the identified content areas could be used to teach sustainable development. Key responses are reflected in Table 13 below.

Table 13: How TVET lecturers related agricultural concepts to sustainable development.

Code	Links between agricultural concepts and sustainable development
Lecturer 1	Agroforestry which uses same principles as permaculture can be used to demonstrate sustainability. Agroforestry is an agricultural practice which integrates crops, trees and animals in a way which mimics nature and improves sustainability practices and protects the natural resources
Lecturer 2	The use chemicals to control pests and insects has negative impact on the environment. The biological methods can be used to control pests and insects through practices such as companion planting, use of natural enemies or use ways like snuff, ginger or vinegar which are cleaner and do not cause damage to the environment
Lecturer 3	Soil Science addresses issues such as mulching and compositing which can be used to teach sustainable development. Composting and mulching trays improves soil fertility, moisture retention and reduces soil erosion.
Lecturer 4	The feedlots in piggery farming can pollute water resources. This content area can be used to teach students how to prevent pollution by channeling water and food substances flowing from piggeries into a place where they can be properly disposed of appropriately.
Lecturer 5	Through issues such as global warming and climate change, TVET colleges should address the methods used in farming that cause damage to the environment. There are changes noticed with weather patterns. There are now frequent experiences of floods and droughts where in some areas, it is too sunny and temperature increases affects production. If production is affected, food security will also be affected. These floods and droughts cause damage to agricultural infrastructure.

The lecturers' responses revealed a strong emphasis on the description of the ecological concepts in Primary Agriculture that can be used for cognitive learning without showing their link to the practical and affective domains, which shows curriculum's biasness or inclination towards production.

4.4.4 Guidelines, tools and processes to support sustainable development into Primary Agriculture Curriculum

The lecturers were asked about the availability of guidelines, tools and processes directly supporting them to integrate sustainable development in their lessons. Lecturer 1 responded that they were never supplied with any guidelines nor tools with the specific purpose of including sustainable development in their lessons. He said he was not aware

of any processes to assist lecturers to include sustainable development into their lessons. However, according to him it takes a knowledgeable and talented lecturer to identify relevant content in the curriculum and teach sustainable development. Lecturer 2 mentioned that the subject guidelines and textbooks provided to them did not clearly demonstrate how sustainable development can be integrated into the Primary Agriculture lessons. Lecturer 3 said that, although, the lecturers had access to textbooks, subject guidelines and assessment guidelines, these resources did not guide them on integrating sustainability learning. All lecturers acknowledged that, without the necessary guidelines and tools guiding integration of sustainable development, they lacked the capability to include sustainable development into existing Primary Agriculture concepts.

Data thus reflect that there were no guidelines or tools to particularly guide integration of sustainable development into the Primary Agriculture Curriculum. The only guidelines and tool available to lecturers were subject guidelines, assessment guidelines, moderation guidelines and textbooks. These curriculum guidelines supplied by the department provided no guidance on the integration of sustainable development aspects. However, one of the lecturers was aware that there was a small portion in Agri-Business that addressed issues relating to sustainable development. Lecturer 4 did confirm that the subject guidelines on Agri-Business contained a section with content on sustainability and factors that affect farming enterprises. Even though, the data shows that the subject covers sustainability content such as social, economic, environmental and political aspects used for cognitive learning, the lecturers were still not able to show the link across the cognitive, practical and aesthetic aspects.

However, the relationship linking the cognitive to practical and then aesthetic aspects was difficult to establish without supportive learning tools. The iteration of sustainable development in Primary Agriculture therefore shows a fragmented understanding of sustainable development because their articulations fail to show links across the educational goals (cognitive, psychomotor and affective aspects as well as in the dimensions of sustainable development (social, economic and environmental).

4.4.5 Capacity to integrate sustainable development

My personal observations on capacity to integrate sustainable development into Primary Agriculture as I engaged and interacted with the lecturers during interviews are as follows: Lecturer 1 and 2 were very emphatic and confident in confirming their capacity to integrate sustainable development in their lessons as reflected by their quality and high number of practical responses quoted in the study as well as their holding the highest academic qualification among the five interviewees. They respectively held a post-graduate diploma and bachelor's degree from university of technology or a formal university. The lecturers with post-graduate or bachelor's qualifications therefore demonstrated a higher comprehension of sustainable development content.

All lecturers suggested that training was required before they were expected to introduce sustainable development in their lectures. They proposed that they must be workshopped to gain comprehensive exposure to sustainable development issues. The lecturers were of the view that relevant training and workshops would increase their capacity to include sustainable development content in their lessons.

4.4.6 Constraints to sustainable development integration into Primary Agriculture Curriculum

The interviewees were engaged on constraints or potential constraints to inclusion of sustainable development into the curriculum. The general findings were that funding, professional development opportunities, equipment and resources for practical learning emerged as some of the key constraints. These are discussed in more detail below.
Lecturer 1 responded that financial constraints would prohibit the procurement of teaching resources and equipment needed to increase capability of lecturers to integrate sustainable development into their lessons.

Lecturers 2, 3 and 4 acknowledged that their lack of professional teaching methodology background may reduce their capacity to integrate sustainable development into their lessons. Their lack of methodology decreased their capacity to effectively apply practical

teaching and assessment methods, which may prevent any attempt at including sustainable development in their lessons, tests and examinations.

Only two of the participating colleges owned farms for agricultural practicals. The other three lecturers 2, 4 and 5 raised the issue of lack of farms as an impediment to conducting practice-based learning and as a barrier to teaching sustainable development. These lecturers were of the opinion that, through hands-on training, students can learn about real life know-how of sustainable practices.

All the lecturers had experienced some form of non-supportive management who declined requests to procure resources needed to conduct practicals. The lecturers suggested that management at colleges must be workshopped on the importance of sustainable development in agricultural training in order to secure resources required to integrate sustainability learning during classroom instruction and practicals.

Lecturers 1 and 4 raised the low admission requirements for TVET programmes as a possible constraint in that students were admitted after completing grade 9. These students struggled with the standard of the current Primary Agriculture Curriculum, which could be worsened by the inclusion of sustainable development aspects. This challenge can be exacerbated by the fact that sustainable development is a new knowledge area to the majority of TVET lecturers. These lecturers may lack capacity to interpret and teach sustainable development content well. For effective sustainability learning to happen, these lecturers need to first undergo thorough training in order to gain comprehensive exposure to sustainable development issues.

The participating lecturers viewed the current Primary Agriculture Curriculum as inadequately resourced to support integration of issues concerning sustainable agriculture. Lecturer 1 mentioned lack of support from external moderators and subject experts as a constraint to the current curriculum and he believed that the situation could even get worse if lecturers were expected to include sustainable development without proper support provided to them.

Following up on the issue of constraints to integrate sustainable development, the interviewees were engaged on how they propose these constraints be addressed. Lecturer 1 suggested that colleges must encourage exchange of ideas and expertise between lecturing staff and management on curriculum innovations to promote the integration of sustainable development content into college programmes. He argued that, with the growing global focus on issues such as the green economy, SDGs and 4th industrial revolution, industries were also beginning to come up with sustainable innovations to reduce their impact on environment. The TVET colleges must produce skills that meet the industries' demands for sustainable solutions. Moreover, Lecturer 3 suggested that colleges must be consulted on any proposal or process to integrate sustainable development into NCV programmes. The process to introduce integration on sustainable development into TVET curricula must be planned together with the implementing colleges in order to empower the lecturers to do it on their own.

Lecturer 3 proposed that TVET students must be supported to access work-integrated learning during their school holidays to gain industry experience and acquaint themselves with new sustainable trends emerging from the industries.

Lecturer 1 suggested that the integration of sustainable development into the college curricula would require appropriate support and monitoring from DHET. A clear policy directive from DHET to guide integration of sustainability skills into TVET qualifications was needed. The colleges as well must be capacitated to develop their own policies on integration of sustainable development into their programmes.

Lecturer 4 proposed that management support must be provided to lecturing staff for them to enter into partnerships with environmental and agricultural institutions to access nature reserves and farming enterprises to observe and learn about sustainability practices. Environmental and sustainability awareness campaigns conducted by environmental institutions and agricultural organizations must reach colleges in order to raise awareness on sustainable development issues. Environmental and research institutions must support

sustainability learning at colleges by providing resource materials such as posters, pamphlets, papers, videos and guest speakers.

Finally, the lecturers were interviewed on support needed by colleges to integrate sustainable development in light of one of the study objectives *"To examine the extent of support needed and provided to TVETs on integration of sustainable development"*. Lecturer 1 recommended that the vision to include sustainable development into the TVET curricula must be driven and promoted from the DHET level. The TVET sector needs a clear policy directive from DHET level obliging all colleges to include sustainable development in curricula. A policy directive to promote development of sustainability skills at TVET colleges must also unlock the supply of required resources and support. The external support from assessors, moderators, subject content experts and monitoring and evaluation must be provided to TVET colleges to ensure that the integration of sustainable development content actually happens.

Overall, Lecturer 5 said that agricultural training required dual instruction comprising theory and practice. A practice-based agricultural training requires access to a farm and equipment to practically demonstrate sustainable agricultural practices. Therefore, the DHET must provide financial support for colleges to acquire these resources.

Lecturer 4 suggested that, to increase capacity of colleges to include sustainable development into TVET curricula, colleges can be supported to enter into agreements with universities to train lecturers on professional teaching methodology and sustainable development courses. The training on professional teaching methodology will enhance capacity to integrate sustainability learning into the Primary Agriculture Curriculum.

4.5 Questionnaires to TVET lecturers administered through e-mails.

4.5.1 Academic qualifications and work experience of TVET lecturers

The review of the respondents' academic qualifications and work experience revealed that the majority of them held academic qualifications in Agriculture and met the basic

requirements to teach at TVET colleges. However, a lack of professional teaching methodology background may affect their capacity to include sustainable development into the Primary Agriculture lessons. All the respondents had industry experience of more than 5 years. The industry experience they listed was acquired in fields such as agricultural extension officers, Agricultural Science teachers, farm managers, abattoirs, veterinary services, agricultural technicians and scientists, and skills facilitators. Their responses revealed that the majority of the lecturing staff at TVETs meet the minimum requirements to teach Primary Agriculture.

4.5.2 Knowledge and understanding of Sustainable Development

The interviewees were engaged on sustainable development to determine their knowledge and understanding of sustainable development. The views and insights shared by the respondents revealed a fair understanding of the sustainable development within the Primary Agriculture contexts. All respondents were able to name pertinent sustainable development concepts within Primary Agriculture. Table 14 provides some insights expressed by the respondents to demonstrate their understanding of sustainable development within Primary Agriculture. These reflect an inclination to raise pertinent ecological concepts that can be used to enhance cognitive knowledge in Primary Agriculture learning without clearly showing how the cognitive aspects flow into the practical and aesthetic aspects. This demonstrates how the lecturers generally view educational goals and sustainable development aspects in isolation from each other.

Table 14: Respondents' insight on sustainable development

Code	Insight on meaning of sustainable development
Resp 1 -17	Sustainable development refers to farming in a way that does not compromise nature
	Agriculture is all about using natural resources for farming purposes in a way that farmers are encouraged to conserve nature while producing food and at the same time saving the natural resource for the benefit of future generations
	Sustainable development in Agriculture should focus on economic development without any misuse of natural resources. Agricultural practices should protect the environment and maintain soil fertility. The programme should contribute to the economy and offer employment to our youth

	Sustainable development is about farming is a sustainable way. Farming that does not compromise future generations and farming practices with an understanding of ecosystems, relationship between organisms and their environment
	Sustainability is about using natural resources, taking care for the future, conserving nature, loving nature. Agri-Business level 3 has a chapter that covers the aspects on sustainability such as environmental, economic, social and political factors

This question was followed by asking the respondents to identify key sustainability concepts. All respondents were able to identify key ecological concepts in Primary Agriculture Curriculum as listed in Table 15.

Table 15: Ecological concepts in Primary Agriculture Curriculum

Environmental theme	Ecological concepts in Primary Agriculture
Climate change	Global warming, droughts, floods, high temperatures, weather patterns.
Water	Clean water, sanitation, irrigation systems
Energy	Affordable and clean energy, renewable energy, saving electricity
Health	Disease and pest management, public health
Food security	Food gardens, organic farming, hunger, tunnel farming
Ecology	Food gardens, organic farming, hunger, tunnel farming Natural Resources: soil management, water management, destruction of natural resources, topography.
Waste and Pollution	Waste management, recycling, farm waste, cattle and chicken manure, animal feeds, avoid pollution, chemical, pesticides, fertilizers, herbicides.
Environmental degradation	Erosion, planting cover crops, mulching, minimize soil degradation, land use planning and management, combating degradation, biodiversity loss and species extinction.

Referring to the Pavlova (2009) framework, the lecturers demonstrated aptitude in recognizing environmental concepts that can be used for cognitive learning in Primary Agriculture that can be used to enhance environmental understanding. However, the biggest gap was in articulating linkages from the cognitive to practical aspects and then to aesthetic aspects as advised in the framework. The responses from the lecturers reflected a fair awareness of environmental aspects of sustainable development without demonstrating how they related to the social and economic aspects. Therefore, the researcher's conclusion is that the Primary Agriculture Curriculum has a strong bias or inclination towards the production side of agriculture.

In reflecting on the link between sustainable development as a priority in the NDP, the respondents reflected a recognition of sustainable development as a universal framework for development. The NDP outlines how the country will transition to a sustainable development path and agriculture is identified as a priority area in the plan. To effectively integrate sustainable development in Primary Agriculture, the respondents need to understand sustainable development within the broader context of NDP. One of the respondents said that sustainable development must be a priority in the government plan and colleges must be supported to include it in their skills programmes. Another respondent argued that government must act now to ensure that NDP promotes agricultural enterprises. According to the later respondent, sustainable agricultural practices will ensure that the country achieves food security for the survival of present and future generations. A third respondent indicated that ensuring that sustainable development was a priority in the government plan will secure economic growth. The country needs economic growth to address national concerns such as unemployment and poverty. Overall, responses suggested that there was recognition at TVET colleges of the importance of sustainable development as guiding framework for the country's economic development.

Literature shows that agriculture enjoys the benefit of being a production sector where significant environmental, economic and social impacts of farming systems can be made more practical (Ahlem and Hammas, 2017). Therefore, TVET's recognition of sustainable development as a guiding framework for country's economic development presents

possible opportunity for actual integration of sustainable development into Primary Agriculture.

4.5.3 Role of Primary Agriculture Curriculum in promoting sustainable development

The respondents were asked how they envisaged the role of curriculum in promoting sustainable development. All respondents regarded the Primary Agriculture Curriculum as a tool that can be used to empower students with skills to promote the quality of agricultural products. One respondent stated that the Primary Agriculture Curriculum can be used to promote a balance between economic development and the protection of natural resources. Another respondent saw the Primary Agriculture Curriculum as a means to empower graduates as prospective farmers with practices leading to viable farming enterprises and production of good quality products without destroying the environment.

One respondent mentioned that Agri-Business had a chapter covering the four aspects of sustainability, namely economic, social, environmental and political factors. Sustainability in Agri-Business teaches students on issues such as sustainable farm management, supply of good quality products to the markets, etc. All respondents were able to identify other areas in TVET vocational subjects that can be used to teach sustainable development such as agroforestry, tunnel farming, no tillage, mulching, organic fertilizers, grazing management, feedlot management, etc. Another respondent raised caution on the stagnancy of the curriculum dating back to 2007 by noting that since the curriculum was introduced, there had been new developments on sustainable farming practices and technologies but that these have not yet been incorporated into the curriculum.

Data thus shows the lecturers' ability to identify isolated snippets ecological concepts in the Primary Agriculture Curriculum that lend themselves to sustainability learning. However, their articulation still shows lack of a connecting link across the cognitive, psychomotor and affective domains as pronounced in the Pavlova framework (2009) used in this study. For the Primary Agriculture Curriculum to play a meaningful role in realizing

sustainable development, the integration of sustainability learning should effectively include knowledge, skills and values/ethics.

Subsequently, the respondents were asked to identify content areas in the existing Primary Agriculture Curriculum that can be used to teach sustainable development. All the respondents were able to identify content areas in Primary Agriculture Curriculum across the technical and vocational subjects that can be used to teach sustainable development. The respondents identified the following content areas in the existing curriculum that can be used for sustainability teaching and learning: food-lot management, organic farming, entrepreneurship, soil erosion, broiler management, vegetable production, crop rotation, soil conservation, soil fertility, pesticides and chemicals, veld management, rotational grazing, overgrazing, animal welfare, organic farming, composting, mulching, agroforestry, permaculture, recycle and farm waste.

This data shows a fair cognizance at TVET colleges of ecological concepts in the Primary Agriculture Curriculum that can be used to teach sustainable development that, if capacity is developed in line with the Pavlova framework (2009), there is a high likelihood of sustainable development inclusion in Primary Agriculture Curriculum.

4.5.4 Guidelines, tools and processes to support integration of sustainable development into Primary Agriculture curriculum

After listing the content areas in agriculture that can be used to teach sustainable development, the respondents were asked if there were guidelines, tools and processes in place to support colleges in integrating sustainable development aspects.

All the respondents stated that they were not aware of any guidelines or tools provided specifically for the purpose of guiding integration of sustainable development into Primary Agriculture curriculum. One respondent clarified that the only guidelines provided to colleges were the general curriculum guidelines such as subject guidelines, assessment guidelines and moderation guidelines. Another respondent confirmed that the general

curriculum guidelines were silent on the issue of integrating sustainable development into Primary Agriculture Curriculum.

The biggest challenge raised by the respondents regarding the Primary Agriculture Curriculum and sustainable development related to the lack of farms and equipment such as nurseries, laboratories, implements to practically demonstrate sustainable agriculture practices. Agriculture requires dual-instruction method comprising theory and practice, which was compromised due to the lack of equipment and farms. The lack of farms and equipment at colleges constrained the integration of sustainable development into Primary Agriculture because sustainable development must be demonstrated practically.

The question on orientation on the use of guidelines and tools was insignificant because there were no guidelines or tools provided to colleges to specifically guide the inclusion of sustainable development content into the curriculum. In addition to the lack of guidelines or tools to support integration of sustainable development into Primary Agriculture Curriculum, half of the respondents complained that they did not receive any orientation and induction on the use of general curriculum guidelines (subject, assessment and moderation). These respondents argued that if they did not receive orientation and induction on the minimum prescribed curriculum documents, how would they even be expected to have capacity to integrate sustainable development into their curriculum teaching.

4.5.5 Capacity of TVET lecturers to teach sustainable development

The research concludes that all the respondents do show potential capacity to teach sustainable development and they all met the minimum requirements to teach at TVET colleges. This capacity was evident in the way that the respondents were able to identify content areas in the current curriculum that can be used to teach sustainable development. With the appropriate training and support in terms of guidelines and resources focusing specifically on sustainable development, the respondents will be able to integrate sustainable development in their lessons.

4.5.6 Constraints to sustainable development integration

The respondents were asked on constraints experienced or potential constraints on the integration of sustainable development into the curriculum. They were all able to identify the following constraints: lack of guidelines, financial constraints, lack of teaching resources/aids, lack of leadership and support towards the integration of sustainable development into the Primary Agriculture Curriculum. These constraints are discussed in further detail below,

- The respondents complained that the curriculum guideline documents provided by the department had limited details on sustainable development content. The current curriculum guideline documents provided no guidance on integrating sustainable development into the lessons.
- The respondents mentioned lack resources to conduct hands-on practical training. The respondents complained that it was almost impossible to teach sustainable development without access to farms and equipment required for practical lessons. The respondents argued that teaching sustainable development required practical demonstrations.
- The respondents ascribed the lack of farms and tools to non-supportive management and supervisors at colleges. The lack of support and resources prohibited the integration of sustainable development into the Primary Agriculture Curriculum.
- The respondents raised a challenge experienced with the low quality of students who enroll for Primary Agriculture qualification. The students were admitted into colleges after completing grade 9 and they struggled with the standard of the Primary Agriculture Curriculum and this could be worsened by the inclusion of sustainable development. The respondents mentioned that problem was exacerbated by the fact that agriculture was not a career of choice to the bright students.
- The respondents raised concerns on time constraints because they also teach fundamental subjects in addition to vocational subjects. These time constraints can prohibit inclusion of sustainable development into teaching as it may be regarded as an option or add-on if support and guidance are not provided.

- The respondent argued that if sustainable development was not openly included in the subject and assessment guidelines, it will continue to be treated as just an option that cannot be assessed and therefore had no effect on the students.
- The respondents raised the challenge of financial constraints for procuring the necessary teaching aids that focused on integration of sustainable development in Primary Agriculture teaching.
- One respondent raised a warning on imposing the integration of sustainable development into curriculum from top-down. They proposed that the inclusion of sustainable development into the Primary Agriculture Curriculum must promote merging of expertise. The process and approach to integration should not be a top-down, but allow for inputs, proposals and ideas from both management and lecturing staff.
- Colleges did not receive leadership, guidance and support from the supervising department particularly on the inclusion of sustainable development.

4.5.7 Support needed by colleges to integrate sustainable development

Further on, the respondents were asked on what kind of support was needed by TVET colleges to integrate sustainable development into the Primary Agriculture Curriculum.
One respondent requested for support to access research papers and journals on sustainable development. Accessing these resources would inform and empower lecturers with latest agricultural knowledge and technologies, including new sustainable agricultural practices adopted elsewhere in the world. All respondents requested that the DHET and college management must provide financial support to procure resources required to promote environmental and sustainability teaching.

Another respondent proposed that colleges can form partnerships with other institutions, government departments, government agencies, industries, commercial farms and non-governmental organizations to access resources such as organic farms, nature reserves, environmental projects and researches on agricultural practices. The lecturers and students can then visit these sites to observe and learn about sustainability practices. Tours to these

sites will foster exchange of information, knowledge and practices on current trends in the sector.

One more respondent proposed that students must be encouraged to join skills programmes such as work integrated learning, learnership, mentorship or voluntary work programmes at workplaces to observe sustainability practices. The students can also be supported to access industries during their school holidays to observe new sustainability trends and practices. The lecturers and students must also be supported to access international mentorship and exchange programmes on sustainable development.

Some of the respondents were aware that there were some colleges who had already started to implement sustainable development who may just need support with content input from experts and monitoring of the projects. There were colleges that participated in the Greening of TVET colleges initiative which received expertise input from GIZ and DEA. These colleges visited the TVET colleges in Germany to observe and learn from their peers on sustainable practices implemented at college level.

One respondent proposed that efforts to integrate sustainable development into the Primary Agriculture curriculum must be backed by clear policy direction and vision driven from the DHET level which would oblige all colleges to comply.

4.6 Data from the document analysis

4.6.1 The White Paper for Post-School Education and Training

An analysis of the White Paper revealed a policy position that reflected weak links with workplaces and offered no articulation possibilities for students, which could result in poor throughput. The White Paper was developed from the need to ensure that TVET qualifications articulated directly into the world of work for the increasing numbers of unemployed youths (DHET, 2013). Therefore, policy on TVET colleges appeared to be preoccupied with empowering youths with skills, knowledge and attitudes needed for employment in the labour market. However, a policy position on TVET cannot disregard

the growing global demand to enable transitions to greener economies and sustainable societies by developing necessary skills for emerging green jobs, as well as promoting sustainable lifestyles and empowering global citizens to create a just, peaceful, tolerant, secure and sustainable world (Lotz-Sisitka et al., 2019, p. 9). Similarly, UNESCO (2012) reiterates the growing demand for skills, values and attitudes that enable youth to lead healthy and fulfilled lives, make informed decisions, and respond to local and global challenges through Sustainable Development.

The White Paper did present possible opportunities for the inclusion of sustainable development by encouraging TVET colleges to maintain close working relationships with employers in their areas of study (DHET, 2013, p. 16). The White Paper encourages close partnerships between colleges and employers in order for college staff and students to get regular workplace exposure so as to keep abreast of developments in their industries (DHET, 2013, p. 16). Such partnerships would encourage employers to input into college curriculum and experts from industry could be invited to teach at colleges in line with skills demands of industry. Therefore, TVET qualifications require adapting in order to improve sustainability approaches and practices in the existing jobs and for developing a workforce suitable for the new and emerging technology jobs (UNESCO-UNEVOC, 2017). In spite of the possible opportunities for inclusion of sustainable development, my conclusion on the reading of the White Paper revealed no direct policy recommendation for TVET qualifications to include sustainable development content.

4.6.2 Policy for the National Certificate (Vocational): A qualification at Level 3 and 4 on NQF

This policy decisively points NCV qualifications towards priority skills demands through sound general-vocational programmes preparing youth for entry into workplaces. NCV programmes emerged as an educational provision for a viable alternative vocational pathway for youth. The NCV programmes are aimed at addressing the poor legacy of the Nated-Programmes which had limited the scope of college provision and inhibited the employability of college graduates (DoE, 2006). However, the NCV policy was built on the assumption that the schooling system would have equipped learners who exit the

system to cope with the cognitive demands of the NCV curriculum. The NCV policy also appears to be more focused on youth training for employment in the labour-market rather than for entrepreneurship. An NCV programme such as Primary Agriculture qualification must support acquisition knowledge, abilities, values and attitudes needed to support resource-efficient farming (UNESCO-UNEVOC, 2017). Chittoor & Mishra (2012) state that the training of human resources in agriculture is often not a high priority in the development plans of many countries. As a result, curricula and training programmes are not particularly relevant to the production needs and employment demands of the agricultural sector. Over and above this, education in agriculture has not kept up with the increasingly complex skills demands of the sector. Factors such as environmental degradation and rapid changes in technical knowledge call for changes in the current systems of agricultural education in many developing countries (Chittoor & Mishra, 2012, p. 120).

4.6.3 NCV Subject and Assessment Guidelines

The NCV Subject and Assessment guidelines outline the syllabus used to equip students with skills, values and knowledge needed to progress through all the levels of the Primary Agriculture Curriculum. The skills, knowledge and values acquired empower students to practice in a mixed farming situation and run a farm as a prosperous business enterprise. Regardless of an explicit curricular objective to deliver skills, values and knowledge in agriculture, no evidence could be established of an intent to deliver skills, values and knowledge connected to transitioning of agriculture towards sustainable practices. However, the curriculum guidelines contain a significant amount of agricultural content that can be used to adapt training towards sustainable agricultural practices, e.g. organic or conservation farming (refer to Table 7 summarizing some of agricultural content areas that can be used to teach sustainable development which formed the basis of my analysis). Sustainable agricultural practices promote conservation of the natural resources, as well as orientation of technological and institutional change to ensure continued satisfaction of human agricultural needs. Adoption of sustainable practices in the agriculture, forestry and fisheries sectors promotes conservation of land, water, plant and animal genetic resources (Chittoor & Mishra, 2012).

The investigation of the Primary Agriculture Curriculum documents, such as subject and assessment guidelines, as already stated in the analysis of data from interviews and questionnaires, confirmed a substantial coverage of agricultural content that can be used to develop sustainable agriculture skills. This content includes the following:

- The subject guidelines for Agri-Business NQF Level 3 cover content area teaching on different aspects of sustainability in agri-business (DoE, 2007g). The supportive assessment guidelines prescribe testing students' ability to explain and understand the concepts of social sustainability, economic sustainability environmental sustainability and political sustainability, in the context of the legal environment (DoE, 2007a). The guidelines for Agri-Business NQF Level 4 focuses on learning of financial planning and marketing of an agricultural enterprise to ensure that farming is practices as a viable enterprise (DoE, 2007h). However, it should be stated that the sustainability in Agri-Business appears more focused on maximizing production and profits rather than promoting environmental friendly practices in the agriculture sector.

- The guidelines for Animal Production NQF Level 3 contain a significant agricultural content that can be used for learning and assessing sustainability. For example, learning about animal breeds in terms of their suitability to environmental conditions including climate, vegetation and diseases (DoE, 2007i). The students are evaluated on concepts such as the application of rotational grazing, control of diseases/parasites and impact of climatic conditions on animal breeds (DoE, 2007b). Through the guidelines for Animal Production NQF Level 4, students learn about animal breeds in terms of their climatic suitability (DoE, 2007j). Students are evaluated on their ability to recognize suitable areas for animal production in terms of climatic conditions, vegetation and market availability which promotes students' knowledge of the climatic zones in southern Africa (DoE, 2007n).

- The guidelines for Plant Production NQF Level 3 contain substantial content areas where students can be taught and assessed on skills and techniques required for

establishment and management of crops and fruits trees (DoE, 2007l). The students are tested on content areas such as agroforestry systems, requirements of agronomic crops and trees, control of pests and diseases using correct control and preventative measures (biological control, chemical control and physical control), crop rotation and mulching (DoE, 2007d). Through the guidelines for Advanced Plant Production NQF Level 4, students learn about advanced plant propagation methods in order to get a good grasp of all aspects concerning the most important and most commonly used plant propagation techniques and when each is used (DoE, 2007f).

- The guidelines for Soil Science NQF Level 3 also cover a significant amount content areas agreeable to sustainability learning such as the use of organic fertilizers (animal manure, compost and green manure) and their benefits (DoE, 2007m). Students can be assessed for sustainability learning on content areas such as soil erosion, factors affecting the amount of erosion and impact of soil erosion on soil profile depth, soil fertility and plant production, as well as preventative measures for soil erosion such as control of grazing, cover crops and mulching, contour ploughing, ridging and terracing and measures to combat gully erosion (DoE, 2007e).

- The guidelines for Farm Planning and Mechanization NQF Level 4 afford opportunities for students to acquire knowledge on natural resources (soil, water, climate, vegetation, topography and sustainable farming system (DoE, 2007k). The students are evaluated on ability to balance potentially competing requirements for agricultural enterprises, e.g. harmonizing sustainability, productivity and the conservation of resources. This requires students to harmonize and recognize the interactions among social, economic, environmental and political sustainability factors, as well as the legal environment in an agricultural enterprise (DoE, 2007c).

In spite of the subject and assessment guidelines containing a substantial amount of content areas that can be used to give effect to sustainable agriculture, no evidence could be established signaling and guiding a shift towards resource-efficient sustainable agricultural

practices. Jabareen (2008) argues for the development of tools and resources to guide teaching of sustainability content in TVET qualifications necessary to address pressing environmental problems of deforestation, climate change and loss of biodiversity emanating from agriculture.

4.7 Conclusion

Data for this study was gathered from the key role-players in the space of TVET in South Africa, namely: policy makers and curriculum developers, and lecturing staff. The data analysis revealed that there was a fair understanding of issues related to sustainable development at colleges. However, there was still no noticeable up-take of sustainable development in the TVET system despite the literature and data showing conclusive evidence of the obvious need to integrate sustainable development across all levels of education and training.

At systemic or the DHET level, the significant limitation on sustainable development was the policy gap where the TVET system lacked a clear directive on the integration of sustainable development into their NCV programmes. The supreme legislative framework (Constitution) and the overarching planning tool (NDP) already provide enabling mechanisms for sustainable development uptake in education and training. However, a clear policy directive is needed for inclusion of sustainable development and that policy must be reinforced with tools, resources and processes supporting integration of sustainable development.

At the college level, there was reasonable awareness of the need to develop sustainability skills. A significant curriculum gap at TVET was the non-inclusion of sustainable development in the existing curriculum, despite the reasonable awareness of ecological concepts in Primary Agriculture Curriculum lending themselves towards sustainability teaching and learning. For that to happen, the current curriculum guideline documents must include sustainable development. Pavlova (2009) stated that while the main purpose of TVET is to build skills, it is important to ensure that skills are underpinned by applicable knowledge, values and ethics. Therefore, skills underpinned by sustainable development

knowledge, values and ethics are needed for economic progress that does not compromise the integrity of the ecological system. However, for colleges to include sustainable development into their skills programmes, concerted efforts from the supporters and partners are required to ensure that colleges are provided with requisite capacity, skills, experience and resources.

CHAPTER FIVE: FINDINGS, RECOMMENDATIONS AND CONCLUSION

5.1 Introduction

This chapter presents overview summary of the findings from the data analysis presented in chapter four. The summary findings are made in relation to the data gathered through semi-structured interviews with officials at the DHET who answered the interviews' open-ended questions. This will be followed by findings made from the data gathered through semi-structured interviews with lecturers at TVET colleges. Then lastly followed on by the findings from questionnaires completed by lecturers at TVET colleges and document analysis. These findings were corroborated through triangulation with secondary data from document analysis. The findings will be followed by the recommendations for these three sets of data.

The summary findings and recommendations made from this study were guided by the study's conceptual framework. A conceptual framework provides an outline of connected ideas, concepts and variables used to describe and interpret integration of sustainable development content into the NCV Primary Agriculture curriculum level 3-4 within TVET system.

In this study the key ideas, concepts and variables to make findings and recommendations on are as follows:

- TVET/NCV policy was analysed to check if it supports integration of sustainable development into Primary Agriculture Curriculum?
- Primary Agriculture Curriculum to examine key sustainable development concepts in the curriculum.
- Vocational subjects are scrutinised to determine how knowledge on sustainable development is included in the Primary Agriculture Curriculum.
- The constraints and enablers to assess the lecturers' perceptions of teaching sustainable development and their knowledge and pedagogy needs for integration of sustainable development in Primary Agriculture.

5.2 Study findings

The findings in this study have shown the following linked to understanding and integration of sustainable development within Primary Agriculture Curriculum:

5.2.1 General study findings

The study findings made from the data gathered for this study on the investigation of the integration of sustainable development into the Primary Agriculture Curriculum reveal the following:

The data shows that NCV policy which directs implementation of Primary Agriculture Curriculum does not explicitly instruct the inclusion of sustainable development into NCV programmes (Primary Agriculture Curriculum). This finding agrees with ASSAF Report which states that South Africa lacks clear policy objectives driving the growth of agricultural education and training (ASSAF, 2017). Similarly, Khwidzhili and Worth (2017) state that South Africa lacks a formally approved inclusive policy on sustainable agricultural practices.

DHET confirmed that NCV policy makes it compulsory for colleges offering agricultural qualifications to have a farm. The assessment guidelines for Primary Agriculture Curriculum requires students to complete farm-based practical tasks (DoE, 2007d). However, the experiences at college level revealed a serious lack of access to farms to conduct practical agricultural lessons, which impedes on the demonstration of sustainable agricultural practices. This by implication, becomes a constraint towards the integration of sustainable development and the development of practical sustainability knowledge.

Flowing from lack of a clear policy prescription for TVET to include sustainable development content, the study found that there was lack of relevant guidelines, tools and processes at DHET level dedicated to support inclusion of sustainable development issues in the curriculum. ASSAF (2017) confirmed lack of guidelines, tools and processes as worsening the incapacity of mostly the unsuitably qualified lecturers to teach agriculture in vocational training colleges. Therefore, there is a need to create tools and resources to enhance the capacity TVET curricula through the inclusion of sustainable development skills needed to address pressing sustainability problems of deforestation, climate change,

and loss of biodiversity emanating from agricultural enterprises (Jabareen, 2008). Nevertheless, the study also found that the DHET Curriculum Development and Support team had a reasonable understanding of the importance of sustainable development and were therefore in a better position to influence inclusion of sustainable development issues into the policy and curriculum. This agrees with the argument made by Singer-Brodowski, Etzkorn, & von Seggern (2019) that the unprecedented levels of environmental degradation demand that sustainable development be imperative for both policy and academia

The data revealed that there was a critical capacity challenge at colleges related to lack of skills on professional teaching methodology or pedagogy. Many college lecturers did not have a professional pedagogic qualification such as a Post-Graduate Certificate in Education (PGCE) to be suitably qualified to teach at college level. McGrath (2004) raised a critical issue of establishing whether the education and training institutions have the requisite support, resources, skills and experience to support the new curricular demands such as inclusion of sustainable development. The DHET confirmed that the policy on the development of TVET lecturers has not specifically prescribed professional teaching methodology qualification as a requirement to teach at TVET colleges. This again may pose a serious capacity constraint on the integration of sustainable development into the TVET curricula. This finding agrees with Pavlova (2016) who stated that colleges had no access to staff professional development programmes and that the management lacked capacity to support development of sustainability values and attitudes among staff. Likewise, the ASSAF report raised a serious concern with quality of TVET lecturers who were not appropriately qualified to teach agriculture in vocational training colleges (ASSAF, 2017). This is important because appropriately qualified lecturers are equipped with the knowledge and skills required to teach (including lesson planning, class organization and actual teaching) and assess effectively (Mannathoko, 2013). It is anticipated that appropriately qualified lecturers would have the aptitude to include sustainable development into their lecture. However, the National Plan for Post-Schooling Education and Training claims that regulations for minimum qualifications for vocational educators in colleges have been developed. The regulations will guide lecturer development and ensure that lecturers meet the minimum professional requirements for employment in colleges. This will go a long way towards improving the quality of

educational provision at colleges. The universities are expected to play a major role in training college lecturers in order to expand their numbers and to improve the quality of their teaching skills (DHET, 2019).

Data revealed that TVET colleges still lacked industry experience and had no capacity to articulate industry needs in their TVET qualifications. There was widespread shortage of capacity in the TVET system to develop the curriculum and skills in response to industry needs across diverse economic sectors. The literature review revealed that the NCV policy had not addressed all needs of vocational qualifications and did not enjoy the full support of industries, specifically in artisan training (Kraak et al., 2016). This was a consequence of the curriculum, materials and skills being developed from the skills supply side with no articulation of the demand side. Literature also revealed the need for knowledge and skills to promote sustainable agricultural practices on the demand side (industries and societies). Therefore, integration of sustainable development into the Primary Agriculture Curriculum must respond to this need.

The study found that there was a fair awareness of sustainability challenges and the importance of sustainable agriculture among the research participants. The respondents in the study were aware that agriculture sector in South Africa remained a significant contributor to the country's economic growth. The ASSAF Report (2017) connects agriculture to no less than 11 out of 17 SDGs. Agriculture therefore forms a common thread which holds the 17 SDGs together (ASSAF, 2017). There was evidence that opportunities existed for Primary Agriculture qualification to include issues such as social inclusion, environmental sustainability, resilience, SDGs, climate change, environmental integrity and sustainability science to develop skills required to promote sustainability and resilience in the agriculture sector (ASSAF, 2017).

Linked to the finding above, the study found that the Agri-Business vocational subject had a chapter which covers the four elements of sustainability, namely, economic, social, environmental and political sustainability (DoE, 2007a). Accordingly, as stated above in the cognitive learning on Primary Agriculture, the curriculum contains ecological concepts across the vocational subjects that can be used for environmental and sustainability teaching and learning.

Although, the study found that the Primary Agriculture Curriculum was rich in ecological concepts, the subject guidelines and assessment guidelines did not provide a clear guidance on integration and assessment of sustainable development. This is in agreement with Chinedu and Wan-Mohamed (2016) who raised the concern that there was a vague understanding of what integration of sustainable development entails, what direction the integration of sustainable development must follow and what was to be achieved by the integration of sustainable development in the sphere of Technical and Vocational Education and Training.

The data revealed that students admitted to Primary Agriculture qualification after completing Grade 9 at Basic Education level struggled with the curriculum. The new curricular demands for Primary Agriculture must be cognizant of this issue due to the already known low throughput at TVET colleges. The ASSAF Report (2017) states that TVET programmes did not attract high-quality students for post-school agricultural studies. In addition, the throughput and quality of agricultural graduates was compromised by lack of resources and equipment for practical agricultural training with limited number of suitably qualified lecturers (ASSAF, 2017). Muramba et al., (2005) also support the statement that TVET training systems were constrained by the low skills level of lecturers, which were worsened by lack of access to sustainable technologies and sustainability content.

Finally, a noteworthy finding was that sustainable development was a fairly new knowledge area to the TVET system and many lecturers did not have an opportunity to learn about sustainability issues during their training period. Pavlova (2009) states that despite the early signs of sustainable development from the early 20th century, it was actually from the beginning of the 1970s that the world experienced a remarkable rise of environmental consciousness. It was from the early 1980s that governments, business, academia and civil society around the world started to be concerned about future of humanity and quality of life for future generations. Therefore, compared to other knowledge domains which have formed part of education and training for many years, it was only in the 1990s that sustainable development began to find expression in the education and training systems. From the early 1990s, the Environmental Education Policy

Initiative (EEPI) began petitioning government for the inclusion of sustainable development into curriculum. This effort was rewarded in 1995 with the inclusion of a sustainable development principle in the White Paper on Education and Training (UNESCO, 2013).

5.2.2 Study findings on integration of sustainable development into Primary Agriculture Curriculum guided by Pavlova (2009) framework.

5.2.2.1 Cognitive aspects

The study findings on the cognitive aspects of the Primary Agriculture learning revealed that the curriculum was rich in concepts that can be used to teach sustainable development. The lecturers identified the content areas in the Primary Agriculture Curriculum that can be used for cognitive learning. For example, the lecturers were able to identify concepts such as agroforestry, rotational grazing, organic fertilizers and sustainability across the vocational areas. These agricultural concepts can be used for cognitive learning of sustainable development. Accordingly, the cognitive learning of sustainable development will increase meaning and understanding of sustainability within the agricultural contexts (Pavlova, 2009). Literature relates cognitive aspects to the transmission of agricultural knowledge needed for environmental conservation (Setiawan, 2017). Similarly, Gokool-Ramdoo and Rumjaun (2017) relate cognitive aspects to the agricultural information processed through teaching to increase sustainable development knowledge. The data revealed that TVET lecturers were aware of the concepts and content area in Primary Agriculture that can be used for the cognitive learning of sustainable development. However, a conclusion cannot be made as to whether the lecturers were capable of teaching these concepts (agroforestry, rotational grazing, organic fertilizers and sustainability) for the cognitive learning of sustainable development.

5.2.2.2 Practical aspects

Regardless of the above finding that the TVET lecturers demonstrated an awareness of the concepts in Primary Agriculture that can be used for cognitive learning of sustainable development, data revealed that the teaching of these concepts was still inclined towards developing skills focused on agricultural growth and development. The lecturers could not articulate the link between cognitive and practical aspects, thereby, showing the inability

to link the concepts used for cognitive learning of sustainable development to the development of sustainability skills. Data did not reveal any articulation by the lecturers of what the practical aspects of sustainable development in Primary Agriculture were. However, literature states that practical aspects as developing skills to critically think of the predicament between development and conservation (Gokool-Ramdoo & Rumjaun, 2017). Similarly, Setiawan (2017) refers to practical aspects as developing the ability for sustainable actions such as minimizing energy consumption or reducing greenhouse gases. Therefore, in this context practical aspects refers to development of skills or abilities for sustainable actions. The data did not show that the Primary Agriculture Curriculum is inclined towards building skills for sustainable agriculture.

5.2.2.3 Aesthetic/Affective aspects

The study findings on the aesthetic or affective aspects of TVET Primary Agriculture showed no conclusive intention of the curriculum to establish values and ethics that treasure interdependencies between humankind and environment, thereby maximizing benefits offered by the environment. Data did not show that the Primary Agriculture Curriculum was predisposed to building values and ethics that promote appreciation of nature, responsibility towards the environment and values amenable to sustainable agriculture. The aesthetic/affective facets refer to the drive or motivation to preserve natural resources (Setiawan, 2017). Data revealed that the prime motive of the Primary Agriculture Curriculum was inclined toward agricultural growth instead of sustainability values and ethics. Literature states that the aesthetic aspects of the Primary Agriculture Curriculum should develop the drive or motivation to conserve natural resources in pursuit of agricultural development (Gokool-Ramdoo & Rumjaun, 2017).

In conclusion I can state that the data studied through the Pavlova (2009) framework revealed a fragmented understanding of key educational goals (cognitive, practical and aesthetic) and sustainable development dimensions (social, economic and environmental). The Pavlova (2009) framework states that the inclusion of sustainable development into the curriculum should reflect these aspects, therefore a holistic understanding and interlinkages of these aspects is critical for effective integration of sustainable development into the Primary Agriculture Curriculum.

5.2.3 Study Findings from Document Analysis

5.2.3.1 Study findings on TVET/NCV Policies

The overarching policy frameworks for the TVET/NCV programmes are the Policy for the National Certificate (Vocational): A qualification at Level 2, 3 and 4 on NQF introduced in 2007 and the White Paper on Post-School Education and Training introduced in 2013. These policy frameworks appear to have been introduced under pressure to redress post-apartheid era imbalances and bring about the requisite transformation in the TVET sector. This is evident in policy focus on repositioning the TVET sector to respond to societal ills such as poverty, unemployment and inequality, particularly affecting the youth. Thus, the White Paper champions the expansion of the TVET system to cater for largest enrolment growth in the post-school system to increase employment and entrepreneurship. Nonetheless, educational policies intended towards societal transformation and easing social ills such poverty, unemployment and inequality must be cognizant of inspiring practices that are consistent with sustainable development. The emergence of SDGs and green economies has intensified demand for policy options that are favourable to sustainable provision of ecological services (Wilson & Tyrchniewicz, 1995). Similarly, Lotz-Sisitka et al. (2019) highlighted that the emergence of sustainable development as a global agenda expanding the need for governments to institute environment and sustainable legislation and institutions to address environmental and sustainable development concerns. One of the objectives of the study is *"To examine the policy directive on sustainable development for the TVET system and NCV programmes".* Although the study of policy documents shows that some dimensions of sustainable development (e.g. poverty, unemployment and inequality feature in policy pronouncements), there was no evidence of overt intention to promote sustainable development through the TVET/NCV programmes, consequently resulting in lack of resources, tools and processes to integrate sustainable development into TVET colleges.

The policy frameworks on TVET are premised on assumption that expanding provision of mid-level technical and occupational qualifications will articulate directly into the world of work. Basically, this means that TVET sector has been expanded and strengthened to provide technical and vocational skills that prepare students for the world of work (DHET,

2013). However, the post-apartheid TVET system and NCV programmes evolved at the same period that sustainable development was evolving into global agenda. For example, the 2002 Johannesburg World Summit on Sustainable Development underscored the necessity of policies integrating sustainable development into all disciplines at every level of society (Lotz-Sisitka et al., 2019). Lasonen (2010) highlighted educational policies as one of the top priority areas for the advancement of sustainable development. The study sought to answer the question on "*How does the NCV policy support integration of sustainable development into Primary Agriculture Curriculum?*" It is important to answer this question, notably because the ILO (2011) credits agriculture as the largest employer in the developing world. The South African primary agriculture sector contributes about 3% to the country's gross domestic product (GDP) and the country's NDP prioritises employment creation by resolutely putting agriculture on the agenda for the next 15 years (ASSAF, 2017). Chittoor & Mishra (2012) argue that the training of human resources in agriculture is often not a high priority in the plans of many countries. As a consequence, curricular and training programmes are not particularly relevant to the production needs and employment trends of the agricultural sector. Moreover, education in agriculture has not kept up with the increasingly complex skills demands of the sector. Factors such as environmental degradation and rapid changes in technical knowledge appeal for changes in the current systems of education in agriculture in many developing countries. ASSAF (2017) states that agricultural activities account for 13.5% of greenhouse gas emissions across the world, thereby, contributing significantly to climate change to which agriculture remains adversely affected. Therefore, this motivates the need for policy and academia to advance building skills for sustainable agriculture across the globe.

5.2.3.2 Study findings on the Subject and Assessment Guidelines

The examination of subject and assessment guideline documents started with an outline of content to be taught and assessed in Primary Agriculture Curriculum, corroborating data from interviews and questionnaires (refer to Tables 11, 12 and 15 showing ecological aspects in Primary Agriculture Curriculum). The analysis revealed a significant inclusion of agricultural content areas that can be used for sustainability learning within agricultural contexts. Although, the guidelines did not demonstrate how sustainable development

knowledge, skills and values can be taught through existing agricultural content. However, the Agri-Business NQF level 3 included sustainable development content, which was inclined toward the viability of agricultural production instead of transitioning agricultural enterprises towards a sustainable development trajectory. UNESCO-UNEVOC (2017) acknowledged lack of sustainability skills as a critical gap in the transitioning towards to green economies and sustainable societies. Therefore, UNESCO-UNEVOC enunciates on a dire need to adapt training towards improving sustainability approaches and practices in the existing jobs and emerging technology jobs.

5.3 Study Recommendations to DHET

Informed by the study findings and literature review above, the study makes the following proposals to policy makers and curriculum developers at DHET, with the aim of influencing and strengthening the integration of sustainable development across TVET sector:

1. The policy on NCV programmes must set a clear directive for TVET colleges to integrate sustainability skills into existing qualifications. This can be actioned through inclusion of sustainable development content into existing subject content, assessment and moderation guidelines, thereby, making it compulsory for colleges to teach, assess and moderate sustainable content.
2. The DHET, with support from universities and environmental institutions, must develop a Training of Trainers Programme on Sustainable Development. This programme can be used to build the capacity of policy makers, curriculum developers, management at TVETs, lecturers and textbook writers.
3. A clear process with tools and guidelines must be developed at national level to guide integration of sustainable development across the TVET sector.

5.4 Study Recommendations for TVET colleges

Informed by the study findings and literature review above, the study makes the following proposals for consideration of TVET colleges with the aim of influencing and

strengthening the integration of sustainable development into the Primary Agriculture Curriculum:

1. The training on sustainable development for lecturing staff must be included in the staff capacity development budget and plan, with the support of the college management and human resource development units. The lecturers need support to identify and attend training and workshops on sustainable development.
2. Colleges must enter into agreements with universities to train lecturers on professional pedagogy through courses such as the Post-Graduate Certificate in Education (PGCE) to enhance capacity to integrate sustainable development into Primary Agriculture Curriculum.
3. TVET colleges must budget for their lecturing staff to attend agricultural and environmental/sustainability seminars, summits, conferences and invite guest lecturers to increase their knowledge on sustainable development.
4. TVET colleges must form partnerships with agricultural institutions and environmental organizations, both at national and international levels, to access mentorships and exchange programmes on sustainable development.

5.5 Conclusion

Modern education and training has socialised people to uncritically adopt unsustainable capitalistic economic development models and consumption patterns that only benefit a few. The prevailing educational goal has been the promotion of employability through development of a workforce to sustain inherent consumerism and economic growth patterns, with negative consequences for the biophysical environment. Current education and training systems are inadequately equipped to sustain the SDGs. There is therefore a need for alternative education and training to build relevant skills and competencies consistent with sustainable development (Gokool-Ramdoo & Rumjaun, 2017).

Nevertheless, McGrath (2004) raised caution on the need to first establish whether education and training institutions have the requisite support, resources, skills and experience to support the new curricular demands such as inclusion of sustainable development. The TVET colleges must be supported and appropriately resourced to build

sustainability skills and competencies, thereby enabling people to appreciate the interconnectedness of sustainable development areas such as agriculture, energy, habitat, economy, education, and democracy. Sustainable development is fundamental to upholding democracy, good governance, rule of law, sustainable and inclusive economic growth, social development, environmental protection and the eradication of poverty and hunger (Gokool-Ramdoo & Rumjaun, 2017).

The unprecedented levels of environmental degradation demand that sustainable development be an imperative for both policy and academia. Education and training have a crucial role to play in remedying these sustainability challenges (Singer-Brodowski, Etzkorn, & von Seggern, 2019). To reverse sustainability challenges caused by agricultural practices requires agricultural education institutions to develop qualifications that empower students with knowledge and skills on sustainable agriculture. Accordingly, TVET colleges can integrate sustainable development into their learning programmes to shape students' values and practices for them to become more environmentally responsible human beings. However, many developing countries including South Africa, practices in agricultural education do not display extensive assimilation of environmental and sustainable concepts and ideas into their educational programmes (Chittoor & Mishra, 2012).

To empower future workers with knowledge and skills to reduce sustainability challenges facing the agriculture sector, the integration of sustainable development issues into TVET qualifications is urgently needed. The integration of sustainability skills into the TVET curriculum can be carried out by infusing them into the existing development of hard skills and soft skills (Setiawan, 2017). Finally, the researcher argues that sustainable development has become a crucial area to be seriously considered in every nation's educational discourse. More specifically, education programmes responding to environmental and sustainability concerns must be included at all levels of formal and informal agricultural education and training in order to build pertinent skills required for sustainable agriculture, thereby ensuring a sustainable supply of agricultural products without compromising the natural ecosystem services.

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7. APPENDICES

Appendix 1: Interview questions for the officials at DHET

1. How is your general educational background and work experience related to primary agriculture as a study field in particular and the TVET system in general?

2. What is your understanding of sustainable development?

3. Do you think sustainable development should be integrated into primary agriculture curriculum? And why do you say so?

4. What are some of the key aspects of sustainable development that need to be considered for primary agriculture curriculum?

5. Have you attended any training on sustainable development? Which key sustainable development concepts and ideas were addressed at the training?

6. What does policy on TVET say on sustainable development? / Which policy can be used to promote SD in TVET?

7. Do you think sustainable development should be imperative for TVET? And why do you say so?

8. How do you envisage role of TVET towards realization of sustainable development?

9. Are there any processes and tools used to promote integration of sustainable development into TVET programmes? And how are colleges empowered through such processes and tools?

10. What barriers/obstacles are experienced in integrating sustainable development into the TVET? And how can these barriers/obstacles be addressed?

Appendix 2: Interview Questions for TVET Lecturers

1. Which vocational subject/s do you teach?

2. How is your educational background and work experience related to teaching primary agriculture at TVET College?

3. What is your understanding or view of sustainable development within primary agriculture context?

3.1 What are some of the key concepts and ideas that you think are central to sustainable development?

4. Do you think sustainable development should be a priority area in the national development agenda and why do you say so?

4.1 What role can primary agriculture curriculum play towards realization of sustainable development?

5. What sustainable development issues (concepts, values, principles or perspectives) are included in the primary agriculture curriculum, textbooks or any other learning support materials?

6. In the current primary agriculture curriculum, are there content areas that can be used to teach sustainable development? And can you illustrate how this can be done?

7. What tools and guidelines are available to guide you in integrating sustainability content in your lectures?

7.1 Were you orientated on the use these tools and guidelines? If yes, do you find them understandable and user friendly?

7.2 Are the tools and guidelines helping you to integrate sustainable development into your lectures?

7.3 Are you now able to comfortably integrate and teach sustainability content in your lectures?

8. What barriers/obstacles do you experience in integrating sustainable development into lesson plans and action projects?

9. What do you suggest can be done to address these barriers/obstacles?

10. What support do you need to enable you integrate sustainable development into your lectures?

Appendix 3: Questionnaire for TVET Lecturers

1. Which vocational subject/s do you teach?

2. How is your educational background and work experience related to teaching primary agriculture at TVET College?

3. What is your understanding or view of sustainable development within primary agriculture context?

3.1 What are some of the key concepts and ideas that you think are central to sustainable development?

4. Do you think sustainable development should be a priority area in the national development agenda and why do you say so?

4.1 What role can primary agriculture curriculum play towards realization of sustainable development?

5. What sustainable development issues (concepts, values, principles or perspectives) are included in the primary agriculture curriculum, textbooks or any other learning support materials?

6. In the current primary agriculture curriculum, are there content areas that can be used to teach sustainable development? And can you illustrate how this can be done?

7. What tools and guidelines are available to guide you in integrating sustainability content in your lectures?

7.1 Were you orientated on the use these tools and guidelines? If yes, do you find them understandable and user friendly?

7.2 Are the tools and guidelines helping you to integrate sustainable development into your lectures?

7.3 Are you now able to comfortably integrate and teach sustainability content in your lectures?

8. What barriers/obstacles do you experience in integrating sustainable development into lesson plans and action projects?

9. What do you suggest can be done to address these barriers/obstacles?

10. What support do you need to enable you integrate sustainable development into your lectures?

Appendix 4: Ethics Clearance Certificate

WITS SCHOOL OF EDUCATION

UNIVERSITY OF THE WITWATERSRAND JOHANNESBURG

SCHOOL OF EDUCATION ETHICS COMMITTEE
CONSTITUTED UNDER THE UNIVERSITY HUMAN RESEARCH ETHICS COMMITTEE (NON-MEDICAL)

CLEARANCE CERTIFICATE	**PROTOCOL NUMBER: 2018ECE015M**
PROJECT TITLE	An investigation of the integration of environmental and sustainability content into the Primary Agriculture National Certificate Vocational (NCV) Level 3-4 curriculum.
INVESTIGATOR	Mr. Pandelani Lucas Dzhugudzha
SCHOOL/DEPARTMENT OF INVESTIGATOR	WITS SCHOOL OF EDUCATION
DATE CONSIDERED	20 May 2019
DECISION OF THE COMMITTEE	Approved unconditionally
EXPIRY DATE	Date of submission of the project report

ISSUE DATE OF CERTIFICATE 27 May 2019 **CHAIRPERSON:** (Dr. Paul Goldschagg)

cc: Supervisor: Dr. Presha Ramsarup

DECLARATION OF INVESTIGATOR

To be completed in duplicate and **ONE COPY** returned to the Chairperson of the School/Department ethics committee.

I fully understand the conditions under which I am are authorized to carry out the abovementioned research and I guarantee to ensure compliance with these conditions. Should any departure to be contemplated from the research procedure as approved I/we undertake to resubmit the protocol to the Committee.

Signature

03/06/2019
Date

PLEASE QUOTE THE PROTOCOL NUMBER ON ALL ENQUIRIES

Appendix 5: Permission to conduct interviews at TVET Colleges

higher education
& training
Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

Private Bag X174, PRETORIA, 0001, 123 Francis Baard Street, PRETORIA, 0002, South Africa
Tel: (012) 312 5911, Fax: (012) 321 6770
Private Bag X9192, CAPE TOWN, 8000, 103 Plein Street, CAPE TOWN, 8001, South Africa
Tel: (021) 469 5175, Fax: (021) 461 4761

Enquiries: Nompumelelo Hlatshwayo Email: Hlatshwayo.N@dhet.gov.za Telephone: 012 312 5337

Mr Pandelani Lucas Dzhugudzha
38 Woodlands Estate
Smuts Drive
Halfway Gardens Extension 3
VORNA VALLEY
1686

By e-mail: pdzhugudzha@environment.gov.za

Dear Mr Dzhugudzha

REQUEST FOR PERMISSION TO CONDUCT RESEARCH AT NINETEEN TECHNICAL AND VOCATIONAL EDUCATION AND TRAINING COLLEGES: AN INVESTIGATION OF THE INTEGRATION OF ENVIRONMENTAL AND SUSTAINABILITY CONTENT INTO THE PRIMARY AGRICULTURE NATIONAL CERTIFICATE VOCATIONAL LEVEL 3-4 CURRICULUM

I acknowledge receipt of your request for permission to conduct research at 19 Technical and Vocational Education and Training (TVET) Colleges on the topic: *"An investigation of the integration of environmental and sustainability content into the Primary Agriculture National Certificate Vocational (NCV) level 3-4 curriculum."*

The Department of Higher Education and Training has evaluated your request and it is my pleasure to inform you that your request for permission to undertake the above research has been granted. As part of your research, it is noted that you will distribute questionnaires to 20 lecturers in Primary Agriculture and undertake one-on-one interviews with 10 lecturers in Primary Agriculture across the 19 TVET Colleges. .

You are advised to obtain further permission from the participants before commencing with your study.

You are also requested to attach the following documents when communicating with the participants.

1) Copy of this letter from the Department.
2) Copy of the "completed application form" to undertake research.
3) Ethical clearance certificate from the University of the Witwatersrand.

The topic of your research is of great interest to the Department. It will therefore be appreciated if you could share the findings of your research with the Department upon completion of your research.

I wish you all of the best in your research study.

Yours sincerely

Dr Hersheela Narsee
Acting Deputy Director-General: Planning, Policy and Strategy
Date: 1 July 2019

Appendix 6: Permission to conduct interviews at DHET

higher education
& training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

Private Bag X174, PRETORIA, 0001, 123 Francis Baard Street, PRETORIA, 0002, South Africa
Tel: (012) 312 5911, Fax: (012) 321 6770
Private Bag X9192, CAPE TOWN, 8000, 103 Plein Street, CAPE TOWN, 8001, South Africa
Tel: (021) 469 5175, Fax: (021) 461 4761

Enquiries: Nompumelelo Hlatshwayo Email: Hlatshwayo.N@dhet.gov.za Telephone: 012 312 5337

Mr Pandelani Lucas Dzhugudzha
38 Woodlands Estate
Smuts Drive
Halfway Gardens Extension 3
VORNA VALLEY
1686

By e-mail: pdzhugudzha@environment.gov.za

Dear Mr Dzhugudzha

REQUEST FOR PERMISSION TO CONDUCT RESEARCH IN THE DEPARTMENT OF HIGHER EDUCATION AND TRAINING: AN INVESTIGATION OF THE INTEGRATION OF ENVIRONMENTAL AND SUSTAINABILITY CONTENT INTO THE PRIMARY AGRICULTURE NATIONAL CERTIFICATE VOCATIONAL LEVEL 3-4 CURRICULUM

I acknowledge receipt of your request for permission to conduct research in the Department of Higher Education and Training (DHET) on the topic: *"An investigation of the integration of environmental and sustainability content into the Primary Agriculture National Certificate Vocational (NCV) level 3-4 curriculum."*

The Department of Higher Education and Training has evaluated your request and it is my pleasure to inform you that your request for permission to undertake the above research has been granted. As part of your research, it is noted that you will collect data by having one-on-one interviews with two (2) officials in the Department responsible for the Primary Agriculture Curriculum at Technical and Vocational Education and Training (TVET) Colleges.

You are advised to obtain further permission from the participants before commencing with your study.

Higher Education and Training • Hoër Onderwys en Opleiding • Imfundvo Lephakame Nekuqeqesha • Ifundo Ephakemeko Nebanduio
IMfundo Ephakame Nokuqeqesha • IMfundo ePhakamiloyo noQeqesho • Dyondzo ya le Henhla na Vulotori • Pfunzo ya Nṱhe na Vhugudisi
Thuto ya Godimo le Tlhahlo • Thuto e Phahameng le Thupelo • Thuto e Kgolwane le Katiso

You are also requested to attach the following documents when communicating with the participants.

1) Copy of this letter from the Department.
2) Copy of the "completed application form" to undertake research.
3) Ethical clearance certificate from the University of the Witwatersrand.

The topic of your research is of great interest to the Department. It will therefore be appreciated if you could share the findings of your research with the Department upon completion of your research.

I wish you all of the best in your research study.

Yours sincerely

Dr Hersheela Narsee
Acting Deputy Director-General: Planning, Policy and Strategy
Date: 1 July 2019