



# Exploring challenges to implementing an effective agriculture-based TVET program in South Africa

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**Abstract:** Technical and Vocational Education and Training (TVET) is an educational field that emphasises on practical and lab-based learning environments. Equally important, TVET also makes a major contribution to the agriculture field. However, there are myriad issues that cause limited knowledge and skills for agricultural graduates, and these include but are not limited to the lack of resources, equipment, and infrastructure. The case study approach allows the in-depth collection of data through interviews and the observation of complex issues in their real-life settings. The research participants were purposefully and conveniently sampled due to their experience in agricultural programmes. The findings were presented using thematic analysis based on Mitzel's model which covers practical knowledge and skills, teaching skills, teaching styles, and personality traits. According to the study's findings, the lack of resources, equipment, and infrastructure restricted a lecturer's capacity to release their practical knowledge and skills, their teaching skills, teaching styles, and their personality factors when teaching agricultural programmes. The recommendation advises allocating the TVET colleges with adequate resources, equipment, and infrastructure to facilitate agricultural knowledge and skills.

**Keywords:** Agricultural programmes, resources, equipment, infrastructure, TVET colleges

## 1. Introduction

The teaching of agricultural programmes in TVET colleges has been hampered by the challenges of implementing an effective agriculture-based TVET programmes. For TVET graduates to learn skills to generate food and create jobs, adequate resources such as, equipment, and infrastructure have always been critical (Taylor & van der Bijl, 2018). Teaching agricultural programmes with limited resources poses significant obstacles to generating high-quality farmers to produce food for the population (Kumar & Joshiba, 2019). On the other hand, having enough teaching resources significantly improves capacity building (Moakofhi, Leteane, Phiri, Pholele & Sebalatheng, 2017). Therefore, it is necessary to identify the challenges of implementing effective agriculture based TVET programmes to ensure the success of the agricultural programmes (Babin, Tutunaru, Cavaleco & Babina, 2021). Identifying implementation gaps assists where the shortages are to enable the improvement of agricultural programmes implementation. Agricultural resources are defined in this study as any equipment or handling facilities that contribute to the teaching and learning of production, including crop, soil, and livestock preparation for practical. Hand tools, walking tractors, tiny tractors, and other implements are examples of agricultural equipment that is used in small-scale farming (Pressman & Sustainable, 2011). These agricultural tools assist in putting the teaching and learning process into practice (Barnawi & Arifin, 2012). On the other hand, an agricultural infrastructure would be any structure that supports the teaching process, such as a school farm,

a garden, a road system, or an irrigation system (Chakwizira, Nhemachena & Mashiri, 2010). The use of resources, equipment, and infrastructure by lecturers positively impacts their teaching methods and overall work (Bhukuvhani, Chiparasha & Zuvalinyenga, 2012). This study was motivated by a growing concern about the challenges of implementing effective agriculture based TVET programmes, which have a negative impact on agricultural education. Teaching agricultural programs to TVET students helps to provide them with employable and self-employment skills. The lack of appropriate and adequate skills contributes to South Africa's rapid increase in the number of unemployed youth (Matli & Ngoepe, 2021; Rivombo & Motseke, 2021; Barford, Coombe & Proefke, 2021). Most TVET graduates remain unemployed and cannot create employment due to the inadequacies in teaching agricultural programmes. The high unemployment rate in South Africa raised the need to explore the challenges of effectively teaching agricultural education programmes so that there is an improvement in the practical applications of the learned skills to improve self-employment (Delavarpour, Koparan, Nowatzki, Bajwa, & Sun, 2021). This suggests that the Department of Higher Education and Training (DHET) should supply the TVET colleges offering agricultural programmes with sufficient resources to mitigate the implementation challenges. In this regard, the study focused on the TVET colleges in South Africa that offer agricultural programmes in the Limpopo province. As a result, this study enriches the knowledge of how the TVET colleges in the Limpopo Province run agricultural courses despite the challenges of implementing an effective agriculture-based TVET programmes.

According to Lemma (2019), the challenges of implementing effective agriculture-based TVET programmes impede the quality of agricultural education in TVET colleges. For example, Mosebeka (2018), looked into TVET as a foundation for societal growth. According to Mosebeka (2018), inadequate resources such as equipment and infrastructure jeopardise delivering high-quality TVET programmes in South Africa. Buthelezi (2018) also looked at the lecturer experiences of post-apartheid TVET college issues. According to the study, a lack of compatibility between the lecturers' adaptability to the improvement of agricultural teaching contributes to the challenges of implementing effective agriculture-based TVET programmes. As a result, this study hypothesises that the challenges encountered when implementing agricultural programmes impede the lecturer's use of presage variables to teach agricultural lessons. This suggests that the agriculture TVET lecturers need adequate resources, equipment, and infrastructure to fully realise their potential as agricultural lecturers. As a result, this study contributes to the understanding of how the challenges of implementing an effective agriculture-based TVET programme affect agricultural teaching.

## 2. Theoretical Framework

The study's theoretical framework is based on Mitzel's (1969) model of teaching agricultural programmes, which was inspired by the work of Dunkin and Biddle (1974). The model includes four variables which are: presage, context, process, and product. The presage variables include practical knowledge and skills, teaching skills, teaching styles, and personality traits. The context variables include the students' prior experience, knowledge, and skills, as well as the personality traits that are important in agricultural program learning. During the implementation of the agricultural programs, the process variables include the interaction of the lecturer with the student as well as the interaction of the student with the other students. The product variable refers to the end results that both the lecturer and the student strive for when putting agricultural programs into action. However, this study focuses on the lecturer's presage variables and how they are distracted during the teaching and learning of agriculture programs in TVET colleges due to a lack of resources, equipment, and infrastructure. Mitzel's (1969) model was used in this study because it helps in understanding what factors influence the lecturers' potential and it also highlights what qualities the lecturers possess. To understand the lecturer's level of their presage variables, the researcher explored the challenges and the barriers that hinder the implementation of an effective agriculture-based TVET program. The purpose of this study was to determine the challenges that hinder the effective implementation of TVET programmes in South Africa.

### 2.1 Practical Knowledge and Skills

Many TVET institutions now place a greater emphasis on practice than theory due to the high demand for practical knowledge and skills. These initiatives are advantageous for the field of agriculture and have significant benefits for students (Easterly & Myers, 2017). The acquisition of relevant knowledge and skills in the teaching and learning of agriculture is practised with the support of resources such as equipment and infrastructure. The availability of adequate resources empowers the lecturers to deliver both practical knowledge and skills (Densford, Rosemary & Ngugi, 2018). In essence, the use of resources, equipment, and infrastructure is essential for producing agricultural products. This viewpoint explains why the lecturers are not able to demonstrate their practical knowledge and skills when they are teaching agricultural programmes without adequate resources, equipment, or infrastructure. Therefore, the practical knowledge and skills are key in the training of students in agriculture programmes (Barrett et al., 2019). As such, the graduates with the relevant and adequate skills can plan to become farmers and can create employment for other people in the sector to contribute to economic growth (Amadi & Ekezie, 2018). This shows that the practical knowledge and the skills competencies should be emphasised because they enable the lecturers to provide students with appropriate agricultural practice and experience (Wellington, 1998).

When teaching agricultural programmes, the lecturers' practical knowledge and skills are crucial factors to consider. The support of resources, equipment, and infrastructure will never be enough to improve the lecturer's performance to provide more practical knowledge and skills to students (Efendi, 2021). However, support is necessary for both the skills acquisition and agriculture teaching. According to research, the availability of resources, equipment, and infrastructure helps in the improvement of the lecturers' practical knowledge and skills (Anafo, Akpah & Ofori, 2020; Das, 2019; Turner et al., 2017). As a result, the use of resources increases the lecturer's potential to perform during agriculture teaching as well as learning and helps to unleash their practical knowledge and skills (Moakofhi et al., 2017; Adala, 2018). Therefore, one is on the hypothesis that if the teacher lacks practical knowledge and skills, this impedes the implementation of effective agriculture-based TVET programmes. The practical knowledge and skills that support the implementation of agricultural programmes in TVET colleges are therefore the areas that were identified as the knowledge gap in this study.

## 2.2 Teaching Skills

It is crucial for agriculture lecturers to maintain and develop competitive teaching techniques. An agriculture lecturer needs to have adequate technical and pedagogical skills to articulate the acquisition of the relevant and adequate knowledge and practical skills to produce agricultural products with the available resources, equipment, and infrastructure (Maeland & Espeland, 2017). The development of the agricultural skills that are available in the TVET programmes are assisted using teaching skills. The use of the lecturer's teaching skills helps in arousing the students' responses during practice, that is when they are using a variety of agricultural resources, equipment, and infrastructure. According to Njura, Kaberia and Taaliu (2020), the agricultural teaching skills contribute to the lecturers' skill development and employability, which are important in agriculture practice. As a result, the lecturers' teaching skills are critical in achieving the learning targets and goals, which include the practicals for agriculture students to demonstrate their capabilities (Gultom, Hutauruk & Ginting, 2020). However, Sephokgole and Ramaligela (2021), argue that the agriculture lecturers are unable to fully utilise their teaching skills due to a lack of resources, equipment, and infrastructure. Hence, one significant aspect of teaching agriculture is to make use of the resources, equipment, and infrastructure that can provide the students with the practical skills' possibilities while also enhancing the lecturer's knowledge of the subject (Pepin, Gueudet & Trouche, 2017). The purpose of the core agriculture courses in the TVET colleges is to equip the graduates with skills that they can use in the real world. The general view is that the lecturers can perform their required teaching abilities in a certain subject area by utilising any available type of resource, equipment, or infrastructure (Mtshali, Ramaligela & Makgato, 2020). However, a lack of resources, equipment, and infrastructure has an impact on the lecturer's ability to conduct agricultural programmes. This view is in line with Amadi and Ekezie (2018), who state that the lack of resources, equipment, and infrastructure, has a negative impact on the lecturers' teaching skills.

## 2.3 Teaching Style

Teaching agricultural programmes necessitates enhancing and utilising various methods that support the implementation of programmes. The teaching style refers to the use of various strategies and methods to teach agricultural programmes (Harfitt, 2012; Lamatokan, 2018). The students' agricultural skills can be developed with the help of teaching strategies and methods. In this study, it is argued that insufficient agricultural resources, as well as the lack of equipment, and infrastructure have negative effects on the lecturers' teaching styles. Diise, Zakaria and Mohammed (2018) aver that one of the lecturer's challenges when using various teaching styles is recognised if there are insufficient resources, as well as the lack of equipment and infrastructure, as which hinders the efforts to vary the delivery of agriculture lessons. The implementation of efficient TVET programmes based on agriculture has also been found to be hindered by the lack of the lecturers' strategies and teaching techniques. These difficulties result in a poor teaching approach, which adversely affects the agriculture students' acquisition of knowledge and skills (Adamu Hamisu, 2017). Hence, it can be argued that a lecturer's teaching style depends largely on the availability and the use of agricultural resources, equipment, and infrastructure to engage students. In line with this view, Romadloni and Mantasiah (2017) affirm that the use of teaching styles, including project involvement, plays a vital role in supporting the students' success in learning practice. In this way, the lecturers can use various teaching styles to empower the students with the appropriate knowledge and skills that are needed for learning content. In this case, Probst, Bardach, Kamusingize, Templer, Ogwali, Owamani and Adugna (2019) assert that if proper care is taken, the resources, equipment, and infrastructure can last for a very long time. Thus, one of the skilful ways to prolong the useful life of agricultural resources, equipment, and infrastructure is through the teaching methods that are used to maintain and sustain their durability. In addition, Huang, Liu, Tlili, Yang, and Wang (2020) prioritise the teaching style over understanding and discriminating between "knowing how" and "knowing what" resources and equipment are needed for certain materials. Notably, the lecturers' teaching style enables the students to grasp agricultural information and identify the appropriate resources as well as the equipment for a given task. The researcher believes that the lack of agricultural resources, equipment, and infrastructure has an impact on the lecturers' teaching styles.

## 2.4 Personality Traits

People choose careers based on their personality traits. The same goes for the lecturers who decided to study agriculture because they have a passion for farming. The personality traits are linked to the teaching attributes such as encouraging, motivating, and helping the students in their agricultural studies, which are critical aspects in this research (Ramesh et al., 2017). The positive effects of the lecturers' personality traits are seen on the TVET colleges' support in encouraging, motivating, and helping the students during the teaching of agricultural programmes. The lecturers' personality traits assist the students throughout the teaching of agricultural programmes (Rothmann & Coetzer, 2003). This means that the agriculture lecturers are always enthusiastic about their work and are motivated by their self-assurance, capability, and open-mindedness. However, the insufficient resources, equipment, and infrastructure undermine their willingness to perform excellently when teaching agricultural programmes. Diise, Zakaria and Mohammed (2018) argue that the lack of a lecturer's encouragement, as well as inspiration, and the lack of resources, equipment, and infrastructure can hinder the implementation of agricultural programmes. The poor utilisation of agricultural resources, equipment, and infrastructure in TVET colleges can have an impact on the lecturers' personality traits. The lecturers with negative personality traits find it harder to encourage, motivate, and help students during a lesson. The other contributing factor to the lecturer's personality traits is collaboration with others, which has been shown to be a powerful stratifying factor when it comes to networking with the other TVET colleges that are offering agricultural programmes (Kwiek, 2020). A lecturer's personality traits help in the sharing and achievement of common goals when networking with resources, equipment, and infrastructure (Tisenkopfs, Kunda, Mane, Brunori, Klerkx, & Moschitz, 2015). As a result, this study sought to find out which personality traits an agriculture lecturer must possess when working in the agricultural programmes at the TVET colleges.

## 3. Methodology

This article presents an interpretive study that aims to interpret data by developing categories for the assumptions that have been made about them (McDonough & McDonough, 1997). This research design was used to discover and understand a phenomenon associated with the implementation of effective agriculture-based TVET programmes. Through employing a qualitative study guided by Mitzel's (1969) framework, the study was able to collect data to explore the challenges that are being met when implementing an effective agriculture-based TVET program. The use of semi-structured interviews served as the primary design, and the confirmatory research utilised observation data (Gray, 2021). Observations were made based on the trends that emerged from the semi-structured interviews to confirm and strengthen the findings and to look for patterns of similarity and divergence from the participants' viewpoints. The purpose of the study was to look for themes and patterns that are difficult to estimate while maintaining the study's context and narrative. The themes and patterns were centered on the study's framework, which included four lecturer variables: practical knowledge and skills; teaching skills; teaching style; and personality traits.

### 3.1 Research Participants

The term "population" refers to the individuals or groups from whom data will be collected (Wiid & Diggins, 2013). The research participants for the study were chosen because they are well-versed in agricultural programmes. In South Africa, there are 51 TVET colleges scattered throughout nine provinces, with 13 of them offering agricultural programmes now. Only six out of the nine provinces have agricultural-focused TVET colleges. The Eastern Cape has three, Limpopo has two, KwaZulu Natal has five, the Western Cape has one, Gauteng has one, and Limpopo has two. The target population of this study was seven public TVET colleges in the Limpopo Province of South Africa. The term "target population" refers to a certain TVET college which could be reached in the most efficient manner to give the most critical information (Hair, Anderson, Tatham & Black, 2008).

In this case, the study's participants were lecturers from the seven public TVET colleges in the Limpopo Province, three of which provide agricultural programmes. This study purposively and conveniently sampled three of these TVET college campuses from this population since they offered agricultural programmes and the researcher believed that the participants were information-rich (Green & Thorogood, 2018). The study targeted three sampled TVET college campuses in the Limpopo Province because they have several agricultural programmes, and they were believed to be information-rich sources for the study. The participants in the study included the lecturers who are working at the three Limpopo Province college campuses, which had about 20 TVET agriculture lecturers in total. All the lecturers with more than five years of experience of lecturing agricultural programmes were used in the study because they are information-rich. Out of the 20 lecturers, a total of 15 agriculture lecturers were purposefully and conveniently sampled from the three TVET college campuses. The participants' data was presented according to gender, age group, program, position, and work experience as shown in Table 1.

There is a significant number of male lecturers ( $n=9$ , 80%), compared to  $n=3$ , 22% of the female lecturers teaching agriculture. The responses indicated that 12 lecturers held lecturing positions, with three lecturers serving as heads of departments. A large proportion of lecturers (73%) participated in the National Certificate Vocational (NCV) program, while 27% participated in the National Accredited Technical Education Diploma (NATED). This implies that the NCV

program lecturers gave more responses about the challenges they face when implementing an effective agriculture-based TVET program overtime, as most of the lecturers (14) had 6–10 years of lecturing experience.

### **3.2 Data Collection Procedure and Instrument**

Semi-structured interviews and the observation of the TVET colleges offering agricultural programmes were used to collect data for this study. For ethical purposes, the participants were informed about the necessity of the use of voice and video recording. Furthermore, prior to data collection, the participants were informed that participation in this study was optional and that they would not be forced or threatened if they did not participate (Vanclay, Baines & Taylor, 2013). The interviews were digitally recorded, transcribed, and evaluated to see if there were any patterns. Observations were done to verify what was said during the interview based on the trend that emerged from the interviews. This involved looking at the effects of resources, equipment, and infrastructure on the teaching of agricultural programmes under the variables that included practical knowledge and skills, teaching skills, teaching style, and personality traits (Mitzel, 1969). Firstly, the participants were given the opportunity to express their opinions and provide a detailed understanding of the effects of resources, equipment, and infrastructure when teaching agricultural programmes in the TVET colleges using a semi-structured interview method. According to Teddlie and Tashakkori (2009), the interviews allow the researcher to inquire and collect the vital data that is needed for the study. As the participants were accessible and available at the time, 15 agriculture lecturers ( $n = 15$ ) participated in these semi-structured interviews. For ethical purposes, the participants were encouraged to participate in the study through volunteering and no participants were subjected to any coercion and none were threatened or harmed for non-participation (Vanclay, Baines & Taylor, 2013). The lecturers from the three TVET college campuses were observed while teaching practical lessons and descriptive notes on the aspects were taken. The main purpose of observation was to watch the lecturers' interaction in agricultural activities while investigating the challenges they face while implementing agricultural programmes.

### **3.3 Data Analysis**

In this qualitative study, data analysis is described as the act of carefully analysing and presenting the researcher's semi-structured interview transcripts and observation notes to enhance the researcher's understanding of the phenomena (Bogdan & Biklen, 1997). The data gathering and analysis happened simultaneously. The data was collected from the agriculture TVET lecturers using a semi-structured interview and observation method. The purpose of the interview data analysis was to get a better understanding of the challenges of implementing an effective agriculture-based TVET program, while non-participant observation was used to see what the lecturers do when they are confronted with the challenges of implementing agricultural programmes. The qualitative data analysis includes data organisation, data transcription, data coding, interpretation and reduction, data presentation, and drawing as well as verifying conclusions (Punch, 2009), which are briefly discussed in the ensuing paragraphs.

#### **3.3.1 Data Organisation**

Data organisation is a critical step in which a large amount of data is organised into manageable units to facilitate coding (McMillan et al., 2010). The first step in data analysis begins with a record of what was gathered (Strydom & Venter, 2005). The interview transcripts and the observation field notes are immersed in the data to gain a sense of the big picture, which leads to the emerging of new knowledge. According to McMillan et al. (2010), the resources including the research question, the themes emerging from the data analysis, and the researcher's prior knowledge or personal experience are useful for data organisation.

#### **3.3.2 Data Transcription**

This qualitative study primarily used two types of data: interview transcripts and the notes from the observations. The interviews were transcribed by replaying them numerous times to enable the capturing of correct data. The transcribed text was organised according to the interview questions as well as the categories specified in the theoretical framework. The interview data and the observation notes were transformed into a format that allows data analysis through transcription. According to McMillan et al. (2010), the interview and observational note transcripts are useful methods of creating concise summaries of the data that will be presented. The lecturer's interview and observation results were presented in the themes that were adopted from Mitzel's (1969) model of teaching agriculture, which contained four themes, as seen in the results and in the discussion: practical knowledge and skills; teaching skills; teaching style; and personality traits.

#### **3.3.3 Data Coding**

Coding is the process of giving the pieces of the data labels, tags, or other identifiers to better understand the respondents. The data was coded to group meaning segments (Neuman, 2011). The fragments could be single words or small or large data chunks (Punch, 2009). According to McMillan et al. (2010), data coding begins with the identification of different data points that can stand alone. These informational units, or "segments," divide the dataset into texts that contain a

single concept or a significant piece of information that can be read independently. As a result, the information was coded using four themes: knowledge and skills, teaching skills, teaching styles, and personality traits. To give the segment meaning, a "code" was used, which could be any activity, or a participant's perspective, action, or idea. Three different types of data coding are recognised as qualitative research in this study. "Vivo codes", are the labels that are made from the words of the participants. When a researcher makes notes within the restrictions of the schedules about the implications of the observation or interview schedules or participant comments on the transcripts, this is known as "open coding" (Springer, 2010). The process of connecting the main categories that appear from open coding and entails relating the substantive ones is known as axial coding, which is what was used in this study (Punch, 2009). Selective coding is the process of identifying the central category, linking it to the other categories in a systematic manner, thereby validating those connections, and adding the categories that need development and improvement for interpretation (McMillan et al., 2010).

### **3.3.4 Interpretation**

When making an interpretation, the logical rules were followed and that led to specific conclusive statements (Springer, 2010). The interpretation of qualitative data is a necessary step that follows the logical drawing and verification of the findings (Punch, 2009). This may indicate new patterns and a higher level of pattern coding, as it suggests concepts at a deeper level than the coding has so far produced. Additionally, it makes connections between the various ideas. Finding patterns in the data is the goal of qualitative research, which aims to connect the main categories (McMillan et al., 2010). The findings will not be generalised because what is happening in the TVET colleges in Limpopo Province cannot necessarily be duplicated in other situations unless the conditions are similar.

### **3.3.5 Drawing and Verifying Conclusions**

This study's data analysis began with a literature review, and it progressed to the interviews and the participant observations with the agriculture lecturers from the three TVET colleges. As the analysis progresses, the conclusions are also verified. The qualitative analysis began to decide what things meant by noting the patterns of similarity from the beginning of data collection, and the conclusions drawn in the form of propositions must be verified (Punch, 2009). After the data has been collected, the conclusion drawing process begins. In other words, the conclusion is analysed and validated to arrive at the ideal conclusion regarding the implementation of effective agriculture-based programmes.

## **4. Results and Discussion**

The findings are presented in accordance with Mitzel's (1969) research question framework. The study's findings indicate that a lack of adequate resources, equipment, and infrastructure hampered the lecturers' ability to unleash their practical knowledge and skills. The study emphasises the critical need for adequate resources to implement effective agriculture based TVET training programmes. The findings on the lecturers' teaching skills revealed that due to a lack of resources, equipment, and infrastructure, the lecturers were unable to employ proper teaching skills. Furthermore, the lecturers were unable to use the teaching styles that would assist the students in developing practical skills. Furthermore, the findings revealed that the lecturers' personality traits helped to stimulate and encourage the students to participate in practical lessons, but the lack of adequate resources, equipment, and infrastructure discouraged the students from practicing agriculture.

The observation revealed similar perspectives on practical knowledge and skills. The observation confirmed the difficulties faced by the lecturers in demonstrating their practical knowledge and skills due to the long distance between the farm and the campus to access the necessary infrastructure to demonstrate practical lessons. Another significant finding indicates a sudden shift in teaching techniques because of a large group of students with limited resources, equipment, and infrastructure, which appears critical if the lecturers are to use their teaching skills and style. Furthermore, the personality traits of a lecturer played an important role in motivating an overcrowded class of students who were grouped together to participate in agricultural practical. Another important factor was the lecturers' ability to collaborate and outsource. To respond to the questions stated in Table 2 below, the data was presented thematically, starting with practical knowledge and skills, teaching skills, teaching style, and personality traits.

**Table 2 - Research questions for semi-structured interview**

<b>Practical Knowledge and skills</b>
<b>Key question: What challenges impede the implementation of effective agriculture based TVET programmes?</b>
Item 1: Elaborate on the benefits the students are getting from this agricultural infrastructure?
Item 2: Why do you think agricultural practice should be emphasised more when teaching agriculture?
<b>Teaching Skills</b>
<b>Key question: Which challenges contribute to a lecturer's teaching skills?</b>
Item 3: How do you teach the practical component if there are insufficient resources and equipment?
Item 4: Do you think that the type of infrastructure you have here meets your students' needs?
Item 5: What kind of resources and equipment do you experience shortages of?
Item 6: What type of resources and equipment do you have here?
Item 7: Do you think that the kinds of available resources and equipment are suitable enough to implement agricultural programmes?
Item 8: How do you make sure that this infrastructure will sustain the college for a long period?
Item 9: Do you think that the lack of agricultural resources and equipment affects the implementation of agricultural programmes?
Item 10: How do you make sure that all the agricultural hand tools and equipment that are utilised during the practical are kept safe?
<b>Teaching Style</b>
<b>Key question: How do the lecturers strategies the teaching of agricultural programmes?</b>
Item 11: What type of projects are you involved in within agriculture?
Item 12: What challenges do you experience when using the available resources and equipment in teaching agriculture?
<b>Personality Traits</b>
<b>Key question: What personality traits must an agriculture lecturer have?</b>
Item 13: How do you keep motivated and how do you display enthusiasm, self-confidence, resourcefulness, and open-mindedness towards your job?
Item 14: How do you collaborate with the other higher education colleges offering agricultural programmes?

The responses of the participants to the various items under each theme were used to generate the study's findings from the interviews and from the observation. The section that follows highlights some of the respondents' verbatim answers from the interview and observation schedule regarding practical knowledge and skills, teaching skills, teaching style, and personality traits.

#### 4.1 Practical Knowledge and Skills

*Item 1: Elaborate on the benefits that the students are getting from this agricultural infrastructure?*

Most of the respondents indicated that the students benefit from the agricultural infrastructure that helps the lecturers to unleash their practical knowledge and skills. In this study, the practical knowledge and skills deal with understanding how to integrate theory and practice into their agriculture lessons. There were interviews and observations regarding the practical knowledge and skills, and many responses were gathered from the questions, but the researcher chose the below responses. In the TVET colleges, the agricultural infrastructure has benefits in many ways. However, that is not the case for Lecturer 11, as the lecturer indicated that the students do not benefit from the agricultural infrastructure. The lecturers experienced challenges when implementing an effective agriculture-based TVET program, as was also indicated by Lecturer 12. The comments, such as the following, were made:

Lecturer 11: *They don't benefit, or they are not getting enough exposure because, out of 100%, only 20%. Furthermore, you may notice that only two, three, or ten students participate at a time, while the rest simply observe.*

Lecturer 12: *The only major obstacle we face is the distance between, uh, the farm and the campus. It's killing us; it's taking our time.*

The challenges of the lecturers to perform their practical knowledge and skills were also confirmed through observation, where the distance between the farm and the campus was a challenge when the lecturers had to demonstrate practical lessons. This is an indication that it was difficult and challenging for the lecturers to implement agricultural programmes without relevant, accessible infrastructure, and that it affected their practical knowledge and skills competency. This

finding is consistent with Das (2019), who found that having access to resources, equipment, and infrastructure can help the lecturers to improve their practical knowledge and skills when teaching agriculture.

*Item 2: Why do you think agricultural practice should be emphasised more when teaching agriculture?*

The generality of responses indicated that agricultural practice should be emphasised more when teaching. Agricultural practice helps the students with the skills to grow crops or raise animals. When teaching agriculture in TVET, the performance of practical knowledge and skills helps the students to acquire the practical skills that are required by the students. The lecturers should place a greater emphasis on practical teaching because teaching in TVET should be more practical than theory, and even teaching agriculture should make students learn more hands-on practice. Though that was not the case for Lecturer 3, as indicated, the lecturers are failing to implement an effective program due to a lack of resources. As indicated by Lecturer 10, the TVET colleges are designed to give students more hands-on practice. The following are their responses:

Lecturer 3: *We want to do practicals for the whole package, but we are failing due to the resources that we have and "that is the big challenge.*

Lecturer 10: *Yes, it should be remembered that the rule of TVET colleges is designed for skills development shortages. So, it makes students learn through hands-on practice.*

According to the study findings, the lecturers place a greater emphasis on skill development than theory. Observation has also confirmed that the lack of resources, equipment, and infrastructure limits the lecturers' ability to use their practical knowledge and skills. This is an indication that the lecturers were unable to demonstrate their practical knowledge and skills due to a lack of resources, equipment, and infrastructure. According to Densford, Rosemary, and Ngugi (2018), the availability of resources, equipment, and infrastructure has a significant impact on a lecturer's demonstration of their practical knowledge and skills.

## 4.2 Teaching Skills

*Item 3: How do you teach the practical component if there are insufficient resources and equipment?*

The teaching skills involve the lecturers' use of resources and equipment in teaching agricultural lessons. According to Njura, Kaberia and Taaliu (2020), the agricultural teaching skills along with resources, equipment, and infrastructure help the students to increase their skills and employability, which is important when they are looking for work or starting a business. The selected lecturers were interviewed and observed by many, but the researcher highlighted those with preferences to the occurrence. In the TVET colleges, the lecturers impart the skills which should be supported by the use of resources and equipment when teaching agricultural programmes. The following are their responses:

Lecturer 2: *Well, it's all about trying to find some makeshift method. If there is something new in the markets that is being used by the commercial farmers, just try to get a picture or a video of how it works so that at least they have a bit of knowledge.*

Lecturer 8: *It's difficult to do that. We don't have enough resources.*

Lecturer 11: *We have a very big challenge.*

According to the study's findings, the lecturers faced difficulties and challenges, including a lack of resources and equipment, when teaching agriculture. These challenges are affecting the lecturers' ability to teach agricultural programmes. Even during observation, the lecturers resorted to grouping techniques when teaching a large group of students with limited resources and equipment. For instance, Lecturer 2 was trying to find some makeshift methods to teach agriculture without resources and equipment. Which means they experience challenges in teaching agricultural programmes without resources and equipment. This is also confirmed by Lecturers 8 and 11, who were teaching with the available resources but found it difficult and challenging to implement agricultural programmes without relevant resources, equipment, and infrastructure, and that affected their teaching skills.

*Item 4: Do you think that the type of infrastructure you have here meets your students' needs?*

The participants referred to the type of infrastructure as not being good, as they were not close to where students can do practicals. In this regard, it was possible to detect a growing concern that the type of infrastructure they have does not meet the standard of training and cannot help the lecturers to unleash their teaching skills. During the observation, it was observed that the college campuses lack the necessary infrastructure to carry out agricultural programmes. The comments, such as the following, were made:

Lecturer 1: *The infrastructure that we have is not good and it does not meet the standard of training.*

Lecturer 10: *The infrastructure issue is also a problem. I can say it's challenging.*

Lecturer 14: *No, I don't think so. For conducting classroom lessons, it's fine. But am still emphasizing that it needs to be close to where students can do the practicals.*



According to the study findings, the available infrastructure was insufficient to meet the needs of the lecturers to perform their teaching skills when teaching agriculture. This conclusion supports the findings of Pepin et al. (2017) that teaching agriculture necessitates the provision of resources, equipment, and infrastructure that may provide the lecturers with the ability to unleash their teaching skills in teaching agricultural programmes.

*Item 5: What kind of resources and equipment do you experience shortages of?*

Agriculture-related TVET programmes need to be resourced and equipped to fully utilise the lecturer's teaching abilities. The majority of the responders acknowledged the need for resources and equipment when participating in agriculture practicals. The observation also revealed that there is a need for infrastructure such as kraals for sheep, calves, and goats, as well as piggery and poultry houses that can serve the purpose of agriculture. Despite the fact that only a few classes had students who actually showed up for class, more resources were required. Several shortages of resources and equipment in agricultural programmes were reported. This question rendered responses such as:

Lecturer 1: *In a class, we need computers, overhead projectors, and the internet. A library with the latest articles, textbooks, and classrooms and office space may be crowded with 3 to 4 lecturers.*

Lecturer 10: *I think we don't have any garden tools that we can say our students can use when doing practicals.*

Lecturer 11: *Transport is another challenge because of taking the students to the farm. Sometimes they will tell you that the bus is being booked by other departments, so now it becomes a challenge.*

Lecturer 7: *We still need sprinkler irrigation. There are other types of irrigation systems in which we must use all these things. We don't have a lab or even a library. We don't even have a planter here that we can use to plant seeds.*

*Item 6: What type of resources and equipment do you have here?*

The researcher noted a few resources and equipment and asked each lecturer during the interview to state what types of resources and equipment they have on their college campuses. During the interview, the lecturers described the resources and equipment available at their different TVE colleges. During observation, there were animal feeding troughs and a shack that served as a storehouse but was in poor shape. The lecturers responded to the question by saying:

Lecturer 4: *We have kraals, but they are not up to standard.*

Lecturer 7: *It's only a drip irrigation system, and that one is an old type or system. We only have one tractor.*

Lecturer 10: *For teaching things practically this side, for soil sciences, what we have is the soil ovals. We do have some testing machines.*

It was noted that the majority of the resources and equipment were either insufficient or did not serve their functions. According to Mtshali, Ramaligela and Makgato (2020), the lecturers can accomplish their required teaching abilities in a certain subject area by utilising any available type of resources, equipment, and infrastructure.

*Item 7: Do you think that the kinds of available resources and equipment are suitable to implement agricultural programmes?*

It is important to know in this study whether the resources and equipment are suitable to implement agricultural programmes. Many responses were gathered from the questions, but the researcher chose the responses below as they were relevant to the question. The resources and equipment used in the TVET colleges offering agricultural programmes should be suitable to implement agricultural programmes. However, that was not the case with the respondents, as they have indicated that the kinds of available resources and equipment were not suitable or sufficient to implement agricultural programs. This is what they had to say in response to the inquiry:

Lecturer 5: *I cannot say they are suitable enough. There is not that much that they can implement for agricultural programmes.*

Lecturer 6: *They are insufficient and inappropriate.*

According to the findings of the study, the available resources and equipment were insufficient to carry out the agricultural programmes. The lecturers are encouraged to teach on a college campus that has adequate resources and equipment. This finding supports Sephokgole and Ramaligela's (2021) assertion that the agriculture lecturers are unable to fully utilise their teaching skills due to a lack of resources, equipment, and infrastructure. Suitable equipment was found at the college farm, which was located outside of the college campus. For example, a practical lesson was held on the college farm, which is roughly 40 kilometers away from the college. Everyone, including the lecturer, was exhausted when they arrived on the farm.

*Item 8: How do you make sure that this infrastructure will sustain the college for a long period?*

It is important to sustain the available infrastructure for future use. The TVET lecturers should use their teaching skills in a manner that helps to sustain the available infrastructure. Therefore, it was important to ask how the lecturers sustain the available infrastructure for a long period, and the chosen responses below were found to be relevant to the question.

The respondents (Lecturers 4 & 6) indicated that they use it in a way that does not damage it as they are trying to sustain the available resources. Lecturer 9 indicated that there is nothing to sustain other than to strive to maintain what they have for it to last them for a long time. The following statements were made by the lecturers in response to the interview questions:

Lecturer 4: *We use it in such a way that we don't damage it. We use it while thinking that the future generation is going to be able to have something that they can be able to study.*

Lecturer 6: *It's not easy. But we are trying because we just take off those tools and we keep them in our offices, knowing that I might happen to break one instead of having ten broken.*

Lecturer 9: *There is nothing that we can just keep sustaining. We don't have any resources.*

According to the findings of the study, the lecturers had little choice but to apply teaching skills to maintain the existing infrastructure. This means that they will continue to use the same teaching techniques they have always used in the absence of adequate resources, equipment, and infrastructure. This finding is consistent with that of Probst et al. (2019), who found that the lecturers rely on their teaching skills to ensure that the institution's teaching and learning materials, equipment, and infrastructure are in good shape for a long period. During the observation, it was also discovered that the lecturers retain some teaching resources in their classrooms or locker cabs because there are no storage facilities. For example, a shack that was in poor shape was used as a storehouse.

*Item 9: Do you think that the lack of agricultural resources and equipment affects the implementation of agricultural programmes?*

Without the necessary resources and equipment, the TVET colleges offering agriculture would not generate skilled agriculture graduates. With regard to the question of whether the lack of agricultural resources and equipment affects the implementation of agricultural programmes, the chosen responses below were found to be relevant to the question. It was found that the majority of the lecturers agreed that it affects the implementation of agricultural programmes. The majority did also give different reasons, as well as examples, and the areas that were affected by that problem. In response to the question, the lecturers said:

Lecturer 3: *Yes. It does have an impact, so if we don't have enough resources, equipment, and infrastructure, we don't have enough workers, we don't have enough skilled workers or skilled lecturers, and the implementation of agricultural programs suffers.*

Lecturer 12: *Yes, they do. Because, like I mentioned, the internet, we need the internet to do research. We can't do that because the resources are limited.*

As stated above, all the lecturers indicated that the lack of agricultural resources and equipment affects the implementation of agricultural programmes. This question was important because the study sought to understand the challenges associated with implementing an effective agriculture based TVET program. As a result, a lack of resources and equipment might negatively impact a lecturer's ability to teach. During the observation, it was also discovered that the lecturer was instructing students on how to plan and construct a farm fence without the necessary materials and equipment. Because of the inappropriate teaching style, the students' groups complained about the strength of their fence, claiming that it was weak owing to a shortage of cement. There was no cement on the material used in the practical. The groups, on the other hand, were able to construct their own weak structures.

*Item 10: How do you make sure that all the agricultural hand tools and the equipment utilised during the practicals are kept safe?*

Most lecturers indicated that they emphasise and encourage the students to clean all the agricultural hand tools and the equipment utilised during practicals and keep them safe in a storeroom. Every lecturer is expected to sustain the available resources and equipment for future use. Therefore, it was important to ask how the lecturers make sure that all the agricultural hand tools and the equipment that is utilised during the practicals are kept safe. The chosen responses below were found to be relevant to the question:

Lecturer 3: *We usually emphasise to the students that if you take a rake or take a digging fork, you use it, clean it, and then return it to the store.*

Lecturers 5: *There is a storeroom, even though it is not of a good standard, where they are kept, and they are recorded. We clean them and keep them in the shack.*

The research findings indicated that the lecturers used the teaching skills that helped them to emphasise and encourage the students to sustain their hand tools and equipment. During the observation, it was also observed that the lecturers kept some teaching resources in the classes or locker cabs with no storerooms or in a storeroom that was not in good condition.

The proper teaching skills will not only help to impart skills but will also help to sustain and maintain the available hand tools and resources over time.

### 4.3 Teaching Style

*Item 11: What type of projects are you involved in within agriculture?*

The teaching styles entail the application of teaching strategies in the classroom. A teaching style should involve the lecturers encouraging, inspiring, and monitoring the students' practical performance via a teaching approach that incorporates them in projects. The teaching of agricultural programmes should be practical, and the students should be engaged in projects as a strategy to practice what they have learned. According to Romadloni and Mantasiah (2017), the utilisation of teaching methods and strategies, including project learning, is critical in enforcing skills when implementing the TVET programmes. Lecturers 4 and 8 have indicated that there are no projects they are doing to engage their students in practicing agriculture. This is a clear indication that the lecturers lack the strategies that can influence the students to practice agriculture in mini projects. The lecturers did not have any form of project to engage their students in agriculture. The chosen responses below were found to be relevant to the question:

Lecturer 4: *Presently, there is no one there. We don't have the proper resources and equipment to use for our own projects.*

Lecturer 8: *No projects because we lack the resources and equipment to conduct projects.*

*Item 12: What challenges do you experience when using those resources and equipment in teaching agriculture?*

According to Diise, Zakaria and Mohammed (2018), the lecturers' challenges in employing alternative teaching styles when teaching agricultural programmes were attributed to a lack of resources and equipment, which sabotaged the attempt to vary agriculture classes. The selected lecturers clearly indicated the challenges they are faced with when implementing agricultural programmes. For instance, Lecturer 1 indicated that they have inadequate resources and equipment. Which means that the lecturers cannot employ a teaching style without resources and equipment. Lecturer 8 also indicated a challenge when using a computer without a network, as that affects their teaching style. Furthermore, Lecturer 8 indicated that it was challenging to experience a shortage of resources and equipment that were meant to support the teaching of agricultural programmes.

Lecturer 1: *The resources or equipment that we have are very inadequate, and you might not believe that we only have 2 or 3, and we are running a class of more than eighty (80) students, which means that it might be the whole day.*

Lecturer 8: *When using computers without a network, you can find out that maybe ten out of thirty are connected.*

Lecturers 10: *The challenge is a shortage. Students are more than those types of machinery or those hand tools we have.*

Due to a lack of resources and equipment, the lecturers were observed using a teaching style that would engage an overcrowded class of students that were grouped together in one large group to participate in agricultural practicals. This is a clear indication that the lecturers face challenges in using appropriate teaching styles that will help to encourage students to participate more in practicing agriculture.

### 4.4 Personality Traits

*Item 13: How do you keep motivated and display enthusiasm, self-confidence, resourcefulness, and open-mindedness towards your job?*

The personality traits relate to teaching qualities such as the ability to encourage, motivate, and support the students to accomplish their agricultural studies. The perceived personality traits of the agriculture lecturers seem to be strong as Lecturer 4 sounded content to transfer knowledge to the students. Another respondent (Lecturer 7) showed a strong personality trait to persist in teaching while experiencing challenges in implementing an effective agriculture-based TVET program. The lecturer said they are dominated by the situation and are waiting for improvement. This is a clear indication that the lecturers have strong personality traits and even experience challenges in implementing agricultural programmes. As reported by Lecturers 13 and 15, they enjoyed their work, and they kept on supporting and guiding students towards agriculture. The chosen responses below were found to be relevant to the question:

Lecturer 4: *The subject we are teaching is agriculture, and i just transfer my knowledge to them.*

Lecturer 7: *It's different. We are so dominated by the situation because we are waiting for improvement, but it is taking a long time.*

Lecturer 13: *I enjoy teaching agriculture subjects because it is more practical.*

Lecturer 15: *I support and guide students towards successful completion of the subject.*

Even though it is difficult working with minimal resources and equipment, the lecturers were observed encouraging and guiding the students through the practical session, even though some students drifted away from the practice group and

participated in private conversations with their peers, while others were absorbed in their phones. A lecturer's personality traits of encouraging, motivating, and assisting the students to complete their agricultural studies can be derailed if they are working under difficult conditions with little resources, equipment, or infrastructure (Ramesh, et al., 2017).

*Item 14: How do you collaborate with other higher education colleges offering agricultural programmes?*

The personality traits refer to those lecturers who enjoy collaboration and work most effectively with others. Several personality traits associated with collaborating with other lecturers were reported. The collaborative traits rendered responses from Lecturer 1, who indicated that they interact with other lecturers in workshops. Another respondent (Lecturer 6) emphasised that they outsource and benchmark with other colleges. The other collaborative way seems to be through holding meetings and Lecturer 8 also emphasised collaboration through working practice for achieving the common goal. This is what they had to say in response to the inquiry:

Lecturer 1: *Yes. Sometimes here they do workshops (lectures, workshops) and that's where you can find you are interacting.*

Lecturer 6: *When we have challenges, we outsource and benchmark with those colleges or universities. We even send our students to the companies outside so that they can merge what they are learning from the book with what is happening in the present world.*

Lecturer 8: *We set up some meetings and we, together, sometimes do the common task.*

This is a clear indication that the lecturers have strong personality traits, which are shown in the act of working together to achieve a common goal. Even during observation, the lecturers outsourced the assistant workers to show the students how to spray animals for tick control on the subject of animal production. The findings are consistent with Tisenkopfs et al. (2015) who found that the personality traits, including the ability to interact and network, help the lecturers to practice and achieve common goals.

## 5. Conclusion

The study explored the challenges that were faced when implementing an effective agriculture-based TVET program. The use of resources, equipment, and infrastructure has a huge potential to improve the teaching and learning at TVET colleges. According to the interview and observation findings, inadequate resources, equipment, and infrastructure, have a detrimental impact on agricultural program teaching. When lecturing on agricultural programmes, these effects can detract from the lecturer's ability to use their practical knowledge and skills, teaching skills, teaching styles, and personality traits. Firstly, the lecturers' ability to unleash their practical knowledge and skills was hampered by a lack of sufficient resources, equipment, and infrastructure. Secondly, due to a lack of resources, equipment, and infrastructure, the lecturers were unable to employ proper teaching skills. Thirdly, the lecturers were unable to employ the teaching styles that would help the students with the acquisition of practical skills. Fourthly, while the lecturers' personality traits stimulated and encouraged the students to participate, a lack of adequate resources, equipment, and infrastructure discouraged the students from practicing agriculture. As a result, if inadequate resources, equipment, and infrastructure continue to detract from the teaching of agricultural programmes in TVET colleges, the lecturers' ability to impart their practical knowledge and skills, teaching skills, teaching styles, and personality traits would be harmed. The study also helps in identifying remaining gaps. The use of resources, equipment, and infrastructure to train students in TVET colleges will be investigated in the future. In the above theme, the researcher has identified the current strengths and weaknesses to further enhance the TVET agriculture student training.

## 6. Implication and Recommendations

This study contributes the most to all the parties concerned with agricultural programmes in TVET colleges since it elucidates the critical variables that must be considered while teaching agricultural programmes, which are practical knowledge and skills, teaching skills, teaching styles, and personality traits. The research is noteworthy in several ways. It informs the DHET that it needs to provide support with adequate resources, equipment, and infrastructure to TVET colleges to enable them to disseminate appropriate knowledge and skills to students. Furthermore, the study contributes to raising awareness of the DHET about the following: There is a lack of suitable resources, equipment, and infrastructure, which is limiting the lecturers' ability to unleash their practical knowledge and skills. If the resources, equipment, and infrastructure are lacking, the lecturers are unable to use proper teaching techniques and styles. The lecturers would not use the project-based teaching strategies that could also help to determine the availability and shortages of resources, equipment, and infrastructure. The study also recommends that workshops must be continually held to preserve the personality traits of the agriculture lecturers. A model focusing on the relationship between the DHET and the TVET colleges, the TVET colleges and the community, and one focusing on the TVET college with another is needed for this situation to thrive. The DHET should focus on the TVET colleges, and it must be prepared to assist them with the required resources, equipment, and infrastructure. To train the students, the community should help the TVET colleges with accessible resources, equipment, and infrastructure. A collaboration among the TVET colleges to help one another with

resources, equipment, and infrastructure outsourcing is needed. If there are no connections between the DHET and the TVET colleges, the TVET colleges and the community, and the TVET colleges, Mitzel's (1969) theory will remain a theory of teaching agricultural programmes for the foreseeable future and will be used to improve practice.

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