The perceived strengths and weaknesses of NATED, NCV and Occupational Qualifications in training plumbers at TVET Colleges

Research Report

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Declaration

I Lesetja James Mogale hereby declare that the study entitled “The perceived strengths and weaknesses” of NATED, NCV and Occupational Qualifications in training plumbers at TVET Colleges is being submitted by me in partial fulfilment of the requirements for the Masters in Education degree. The content embodied in this project is my original work and has not been submitted to any other institution for the award of any qualification. I solemnly vouch that this content has not been presented earlier in this form. The information contained is purely of academic interest.

Name	Signature	Date
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ABSTRACT

This research report investigated the perceived strengths and weaknesses of NATED, NCV and Occupational Qualifications in training plumbers at TVET Colleges. The research investigated the views of lecturers, learners and campus managers on what they view as the strengths and weaknesses of NATED, NCV, and Occupational Qualifications in training plumbers at TVET colleges.

The main differences are the manner in which practical and theoretical knowledge are taught in the three courses, which appears to be a strong factor in the perception of the strengths and weaknesses of NATED, NCV, and Occupational Qualifications. The main weakness of the NATED qualification is the absence of the practical component at the college level. However, the main strength of the NATED is its flexibility to allow working students to attend classes on a block release basis or as part time students.

The main weaknesses of NCV is that it does not allow employed students to attend classes on full time or part time bases. The qualification require students to complete the whole three years to exit the programme. However, the strength of the qualification is the basic practical component which provide students the skills to start own businesses.

The strength of Occupational Qualification is that its students are already employed by their different companies as apprentices. The main weakness is when the host employer is not able to conduct all practical component and the lead employer is not able to find the alternative host employer to conduct the missing practical component.

In conclusion, the three qualifications differ significantly in the approach and delivery method. Although they all lead to apprenticeship which ends with candidates taking a trade test to qualify as artisans, their different approaches signify weaknesses and strengths.

KEYWORDS

NATED, NCV, Occupational Qualifications, TVET Colleges, Workplace, Students, Campus Managers, Lecturers, Plumbing and Trade Test

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CHAPTER ONE: INTRODUCTION

1.1. Background to the topic

This is a study into the perceived strengths and weaknesses of selected learning programmes offered for training plumbers in South African Technical and Vocational Education and Training (TVET) colleges in the field of engineering studies. There are three types of learning programmes, offered against the National Technical Education (NATED) qualifications, the National Certificate Vocational (NCV), and Occupational. The study uses plumbing qualifications offered at National Qualification Framework (NQF) level 3 as a case study to compare the three types of offerings. The study looks into perceptions of lecturers, campus managers, and students in the provision of the three qualifications. The study also examines the policies of the Department of Higher Education and Training (DHET), the Department of Basic Education (DBE), and the Quality Council for Trades and Occupation (QCTO) regarding the provision of curricula for vocational education and training.

The White Paper on Post-School Education and Training explains that, until the establishment of the democratic government and for a few years beyond, technical colleges offered qualifications known as Nated (DHET, 2013a). These qualifications were specifically designed for industry and were presented as trimester programmes. According to the White Paper on Post-school Education and Training, students would spend one trimester in the college setting and two trimesters in the workplace (DHET, 2013a). Wedekind (2014) concurs, explaining that the Nated courses were the oldest qualification linked to the apprenticeship system, and offered in a trimester arrangement that allowed apprentices to complete their training whilst working through block release at respective companies.

However, over the years, the Nated programmes have become outdated. (Wedekind, 2014) outlines that although some employers supported the Nated programmes, others were concerned about their outdated curricula. Wedekind (2014) stresses that, whilst the Nated qualification was critiqued in the 1980s, companies were familiar with it and Nated's mode of delivery well-matched students already in employment as apprentices. Some students no longer spent time in workplaces, because of difficulty in finding opportunities in the labour market. As a result, they enrolled for one trimester after the other in a college. Subsequently, as a direct response to student demands,

colleges continued to offer the Nated qualification even though students no longer had access to the workplaces to complete the practical component.

However, McGrath & Akoojee (2009) argue that the trend that students continue with the theoretical component at colleges without any access to work placement undermines the college-employer relations and contributes to an increasing mismatch between the programme offering of the colleges and the demands of the industry. Hence, Gamble (2003) concurs that a theory-practice combination needs colleges to offer the theory component of the apprenticeship training, whereas context-specific work experience is provided by workplaces. These articulations findings clearly show that industry demands the application of knowledge gained through the Nated qualification at colleges and not just the narrow, tasked-based practical abilities.

The White Paper on Post-school Education and Training states that in 2007 a new National Certificate Vocational (NCV) was introduced as a general vocational programme which was intended to integrate theory and practical (DHET, 2013a). The NCV was contextualised as a full-time qualification on three levels of the NQF that provided for an alternative pathway to the schooling system (Wedekind, 2014). Indeed, the qualification included subject specialisation in a vocational field as well as fundamental subjects such as communication, life skills and mathematics / mathematical literacy as compulsory subjects.

According to Wedekind (2014), the aim was that NCV students would exit the TVET college system with a well-grounded vocational education, with some specialisation, but would have had practical experience as part of the qualification through work in college-based workshops and exposure to workplaces. However, no on-the-job training would be formally provided for the NCV students (Allais, 2012). It is also important to highlight that, the practical component offered for the NCV students is only the basics of the trade.

The Department of Education initially instructed the colleges to implement the new NCV qualification and phase out the Nated qualification, following an announcement by the department of labour that apprenticeships should be phased out and replaced by learnerships. (Wedekind, 2014) points out that the Nated courses were however allowed to co-exist with NCV when the Department of Labour affiliated bodies such as labour organisations and industry unions voiced their concern at the intended phasing out of Nated courses overnight. Therefore, colleges continued to offer the Nated and NCV qualifications in order to satisfy the requirement of both

Departments. A plan to phase out Nated gradually was mooted but due to a slow pace of learnerships development, and the disenchantment of some employees, apprenticeships remained in place and Nated remained a requirement for trade tests. The DHET in response to all these developments made a decision to formally increase Nated numbers.

Although the NCV curriculum does include an extensive practical component, many colleges have not been able to implement it. The White Paper on Post-school Education and Training suggests that as a result, learners exit these programmes without the necessary practical skills. Wedekind (2014) points out that there is a clear conflict between the admission policies of NCV and actual practice on the ground. Though colleges enrol young people who completed Grade 9, 10, and 11, the situation on the ground presents a violation of the policy by some colleges who in the quest of producing better results end up enrolling more students who completed the National Senior Certificate than the intended grades.

Central factors brought about even more challenges for the NCV qualification. There had been no advocacy campaign to promote the NCV qualification by DHET, this led to a weak public understanding of the NCV. Although there had been some effort to consult the industry, the nature of the qualification was never understood by employers (Wedekind, 2014). There was an assumption that the NCV was replacing the Nated qualification because its implementation was related to the phasing out of the Nated qualification. However, this was not the plan of the Department. The plan was that the newly developed skill courses linked to learnerships would replace the Nated. Wedekind (2014) explains that the NCV symbolised a completely new orientation of colleges to full time general vocational education.

More concerns about the NCV were that industry was not happy about the full-time three-year nature of the qualification, which they argued made it undesirable to train apprentices for their sector. The purpose of NCV was not understood by the general public, and so it was viewed as a qualification for those not able to cope with school academic demands (Wedekind, 2014).

I have been involved as an employee of the Department of Higher Education and Training (DHET) in analysing the examination results of colleges. In NCV, I have noted that most post grade 9 high school students do not do well in the examinations right from level 2. Due to this poor performance, some colleges as highlighted by Wedekind (2014) therefore end up contravening regulations regarding enrolment of learners into NCV courses in order to get a better pass rate.

Colleges have tried to comply with the directive from the National Planning Commission regarding improving access to college qualifications. The National Planning Commission (2012) states that colleges should provide young people with continuing access to learning opportunities and qualifications, including general vocational certificates, technical or occupational qualifications and issue higher certificates, and other programmes to qualifying candidates.

The third set of qualifications under consideration is the occupational qualifications. The Quality Council for Trades and Occupations (QCTO) which was introduced in 2010 as a juristic person in terms of the Skills Development Act (1998) established the Occupational Qualifications Sub-Framework (OQFS) for trades and occupations. The QCTO issues certificates to learners who demonstrated competence against occupational qualifications registered on the National Qualifications Framework (NQF) using the set minimum standards for quality assurance (QCTO, 2015).

The Skills Development Act (1998) states that the QCTO was established to develop occupational qualifications that will be nationally utilised and address several challenges in the vocational education and training sector. The revised QCTO policy on accreditation of skills development provider QCTO (2015) reports that the new occupational qualifications differ from the Nated and NCV qualifications in that, they comprise a scheduled workplace component. In other words, the students will be attached to companies as apprentices before registering at colleges for the new occupational qualifications.

QCTO (2015) further states that the Historically Registered Qualifications (i.e. the unit standards, Nated, NCV and learnership) must be deregistered and replaced by the new occupational qualifications in order to avoid confusion in the vocational education and training sector. Furthermore, offering the historically registered qualification will exacerbate the risk of the vocational education and training institutions not using the new occupational qualifications.

The National Skills Development Strategy and Analysis Report DHET (2017) states that, QCTO which is the statutory body responsible for setting standards and quality assurance of occupational qualifications is intending to change the policy on the training of apprentices. The new system will be based on the occupational qualifications. According to Von Maltitz (2018), some of the new occupational qualification are being offered through an experimental ‘dual system’ of training artisans whereby apprentices rotate regularly between a TVET college and a workplace. This dual

system has been piloted with 4 colleges with new electrical and plumbing qualifications from 2016. "The lessons learnt from the pilot project will be used to inform the delivery and rollout of 13 additional trades in 26 colleges through the DHET's Centres of Specialisation" (Von Maltitz, 2018, p. 2). In other words, the dual system is the forerunner of the Centres of Specialisation and together, they will form a new pathway of training apprentices in South Africa. Because I am concerned with plumbing qualifications in this study, and the plumbing occupational qualifications are offered through the dual system pilot, my study will be concerned with these, as opposed to occupational qualifications more generally.

The dual training system contains a structured and mandatory workplace component. To summarise, students who enrol in the dual training system will be employed by companies as apprentices. Some TVET colleges offer plumbing in the Nated, NCV, and occupational qualifications through the dual system pilots. In some cases, two of these qualifications are taught by the same lecturers, but at different times. There are three different types of qualifications at the same level, all aiming at preparing learners for the same occupation.

These qualifications have different curricula, different durations, different requirements for practical, different design features and different funding models. And yet, they are offered in similar or the same learning fields. It is demanding to offer all three qualifications in a single institution.

1.2. The Problem Statement

Students who want to study plumbing as a trade must choose between the three qualifications. Some students change the qualification pathways from one to the other after a certain period. This demonstrates that there are perceived strengths and weaknesses of NATED, NCV and occupational qualifications in training plumbers at TVET Colleges.

According to the National Development Plan NDP (2015), TVET colleges continue to offer traditional theoretical training for apprenticeships through the old technical college instructional programmes popularly known as Nated and NCV qualifications. NDP (2015) states that delivering these programmes in a single institution is difficult and can be confusing. The National Skills Development Strategy Analysis Report states that "the current architecture of the South African vocational system poses many challenges, including a confusing mix of overlapping and

competing programmes and qualifications" (DHET, 2017, p. 59). The White Paper for Post-School Education and Training agrees that, administering the current mix of qualifications in the TVET colleges is complex, difficult for learners and parents to understand, and often poorly quality-assured (DHET, 2013b). Students who want to enrol for a plumbing qualification are not sure of which qualification they should choose especially if they meet the entry requirements for all three qualifications. According to the DHET admission guideline policy, grade 9 is the minimum entry requirement for all three qualifications. However, colleges may add more requirements to the guidelines (DHET, 2019a).

QCTO introduced the occupational qualifications, dual system to replace the Nated and NCV qualifications as they claimed that they are better since they enable students to get employment as apprentices before registering at the college (QCTO, 2015). The occupational qualification students who participate in the course must first be employed as apprentices of their companies before enrolling as students at the college. The occupational qualifications, through the piloted dual system, currently have enrolments of about 400 students in 20 colleges. DHET (2020) reports that 50 colleges combined enrol over 400 000 students who are registered for Nated and NCV qualifications in engineering studies.

Availing three courses from which learners are to choose their pathway towards a plumbing qualification is an unnecessary duplication and also confusing to say the least. The research seeks to outline the perceived strengths and weaknesses of each of the three main qualification pathways-NATED, NCV and Occupational qualifications. It is the intention of the research to find out how students who want to study plumbing as a trade may come out with a choice under the prevailing and confusing circumstances whereby three courses are at their disposal towards the acquisition of a plumbing qualification. It is probable that students' choice may be informed by certain strengths they identify in a course and that students may shun certain courses because of weaknesses the students identify in a given alternative course. It is however important to highlight the fact that the duplication that prevails is confusing to students.

1.3. Research question

What are the perceived strengths and weaknesses of the three main qualification pathways-NATED, NCV and occupational qualifications, dual system for plumbers?

Sub-questions:

- How is the curriculum for plumbing structured in the NCV Levels 2-4; NATED N1–N3; and Occupational qualifications?
- What are the lecturers' views about the value to students of each of these qualifications?
- What are the students' views on the offering of these programmes in a single institution?
- What are the campus managers' views on offering three plumbing streams at the same college?

1.4. The objectives of the study

Main objective

The main objective of the study is to investigate the perceived strengths and weaknesses of NATED, NCV and Occupational Qualifications in training plumbers at TVET Colleges. Some colleges offer all three types of plumbing qualifications in the engineering field of studies. This study explores the features of the three qualifications using plumbing as a case study.

Sub-Objectives

- To outline how the curriculum for plumbing is structured in the NCV Levels 2-4; NATED N1–N3; and occupational qualification, dual system qualifications.
- To investigate how curriculum for plumbing is structured in each of the three qualifications i.e. NCV Levels 2-4; NATED N1–N3; and occupational qualifications.
- To describe the lecturers' views about the value to students of each of the qualifications.
- To describe how the students view the offering of the programmes in a single Institution.
- To outline the campus managers' views on offering three plumbing streams at the same College.

1.5 Significance of study

This study is significant because its finding will help the colleges, DHET and other stakeholders identify the strengths and weaknesses of NATED, NCV and Occupational Qualifications in the training of plumbers at TVET colleges. It is envisaged that identification of the strengths and weaknesses of the three courses will help the college design better approaches in the training of plumbers across the three courses.

1.6 Delimitation of the study

This research was confined to two colleges, one in the Eastern Cape and another in Gauteng. The researcher chose two provinces to ensure there is a comparative analysis of what Eastern Cape and what Gauteng perceive as the strengths and weaknesses of the three programmes.

1.7 Research Limitations

This study faced challenges in terms of time to cover colleges that are situated in the two provinces that is Eastern Cape and Gauteng. The researcher had to find ways of ensuring they create time to cover the colleges of the two provinces. The researcher also did not assess the employment rate of each programme. As a result, employers were not interviewed, that could limit the extent at which each programme is perceived by employers. There is also a possibility that some important data may not have been obtained from employers.

1.8 Conclusion

In summary, the study investigated the perception of lecturers, students, and management of colleges regarding the offering of all three qualifications in a single institution, focusing on differences in the structure, design and purpose of each qualification.

In the following chapter, I will discuss the background and indicate how the three qualifications came to co-exist. The next chapter will show what each qualification was designed for, and indicate the key differences across the three qualifications.

CHAPTER TWO: BACKGROUND AND CONTEXT

2.1. Introduction

This chapter provides contextual background to the study. It starts with an outline of the key differences across the three qualifications followed by organisation of time. It further gives a detailed outline of when and how practical knowledge is taught. The chapter further articulates on assessment as well as funding. It is necessary to outline these issues so that the reader is provided with adequate facts to enable them to comprehend issues that are related to the topic.

2.2 Background and context

According to DHET (2013c), the scope of Post-school education and training is to equip students with the necessary theory component of the trade, whilst the practical aspect of the learning is completed within the working environment in relevant industries. The White Paper for Post-School Education and Training states that the apprenticeship training had traditionally been provided through a block release system whereby companies employ apprentices and then send them to a college for one trimester per annum to complete the theory-base course known as Nated (DHET, 2013b).

2.3. The issues relating to how these qualifications were developed.

SAQA bulletin reported in 2016 that the NCV and NATED curricula are under review, and QCTO is developing new qualifications to replace some older skills courses and NATED curricula (SAQA, 2016). This new development left TVET colleges under enormous pressure due to the increasing focus on workplace learning (SAQA, 2016). The new development meant that the NATED and NCV qualifications were expected to be phased out and replaced by the new occupational qualifications.

The next section looks at the matters relating to the intention and purpose for each qualification. It must be remembered that each of the qualifications leads to the trade test which qualifies apprentices as artisans. The main focus is on the training of apprentices through theoretical and practical components both at the college and at the workplace.

2.3.1. Nated Programme

Papier, Needham, Prinsloo, & McBride (2016) identified the conditions which are instructive for a worthy quality pre-employment training, while at the same time recognizing that the good quality training of apprentices is through 'on-the-job' training. According to Papier et al., (2016), the following learning 'gaps' in the curriculum for Nated qualification were attributed to industries: Professionalism; Communication skills; Understanding the workplace; Values and ethics; and Application of college learning to the workplace. This is illustrated by the fact that the industry is not involved in the development of college curriculum for Nated qualifications.

Papier et al., (2016) believe that, after identifying perceived learning gaps in the college curriculum, employers should be involved in the development of the curricula that are used in workplaces that are specific to particular industrial requirements. Gamble (2009) agrees that, the curriculum development excluded the application of knowledge in workplaces, or any form of 'trade knowledge'. Learning how to apply scientific knowledge in specific workplace contexts was left to the apprentices and individual employers, with no direct relationship between theory and practice.

2.3.2 NCV Programme

Allais (2012) states that, the Department of Education (DoE) responded to the announcement by the Department of Labour (DoL) that the apprenticeship will be phased out by developing the new college qualifications known as the National Certificate Vocational (NCV). The NCV is for learners who chose not to undertake a Technical Senior Certificate after completing grade 9 (NDP, 2015a). It was envisaged that the NCV would replace the Nated programme which provided the theory component of the apprenticeship. It was expected that NCV would be much broader and more substantial by integrating theory and practical in colleges. However, the process of developing the NCV was perceived by the college communities as having been hurried because it took just less than a year from the process of conceptualization to implementation (Wedekind, 2014). This is the reason some colleges experienced difficulties in offering the NCV qualification. This means that, lecturers were not prepared to offer the qualification. Some lecturers did not know how to use the equipment and workshop tools.

Cosser, Kraak, & Winnaar (2011) explain that the NCV was introduced in 2007 with just fourteen programmatic fields. The enrolment of NCV was not large enough to compensate for the drop in

the Nated enrolments. In 2009 the throughput of students who started the programme in 2007 was only 4, 4%. According to Cosser et al., (2011) the poor throughput rate is the reason for low enrolment for the NCV qualification. The poor throughput results mean learners stay in the programme leading to the qualification for an extended period.

Buthelezi (2016) emphasises that the TVET colleges in South Africa went through major institutional, structural, and curriculum changes over the last few years. She reported that there were unintended consequences for educational change as perceptions and experiences of lecturers changed for the national vision of skills development in the country. Although the lecturers were trained through workshops on the changes regarding the new NCV qualification there was little time for preparation and support for implementation so soon (Wedekind, 2014).

Similarly, Terblanche (2017) agrees with Buthelezi (2016) that, TVET college curriculum reform is unavoidable. She argued that such reform has the potential to contribute in different ways to improve employability and success rates of TVET college graduates.

Post–School Education and Training Monitor (DHET, 2019b) reports that, the national enrolment of students in 2018 were 131 212 for NCV level 2 to level 4, at the same time 482 175 students enrolled for N1–N6, whilst 20 106 students enrolled for the occupational qualifications. The difference in enrolment for these three qualifications is huge and the literature will assist in providing an explanation. Students enrolled in these programmes for a particular reason. The study seeks to investigate the reasons for students to choose one programme over the other. Students perceive that each programme have weaknesses whilst others have strengths.

2.3.3. Occupational Qualifications

The National Planning Commission (2012) reports that the TVET colleges have weak relationships with industry, leading to incomplete training because of lack of workplace exposure. In response to this criticism, DHET decided to implement a pilot project on a dual system of training artisans whereby apprentices rotate regularly between the workplace and the college (Von Maltitz, 2018). The pilot project started with four colleges training electricians and plumbers in 2016. The project was later extended to 16 other colleges with additional 13 trades offered on 26 campuses. The selected campuses where the project is taking place are known as Centres of Specializations (DHET, 2016).

According to the report on Centres of Specialisation (DHET, 2016) The Department selected 20 TVET colleges to pilot the offering of the Occupational Qualifications using the 13 trades among the list of the priority trades. The pilot project involves different stakeholders, ranging from a selected number of TVET colleges chosen by DHET to be Centres of Specialisation for one or more of the thirteen priority trades. The other stakeholders include the employers and people with special expertise in different priority trades. Plumbing is one of the priority trades identified by DHET. According to DHET (2016), QCTO plays a central role in setting the standard for the accreditation of these centres. The arrangement of when students attend at college and workplaces is determined by colleges and the respective companies where students are placed for workplace experience.

The dual system is based on the occupational qualifications which were developed by the Quality Council for Trades and Occupation (QCTO). Therefore, QCTO is responsible for the development, maintenance and quality assurance of standards in its sub-framework (QCTO, 2015). The occupational qualifications comprise of knowledge, practical and workplace experience components. In other words, students must first be registered with companies as apprentices before enrolling at a TVET college. The occupational qualification students attend classes at TVET colleges for knowledge and practical component. The workplace experience component is conducted at companies where apprentices complete training by taking the trade test and qualify as artisans.

In 2014 the Minister of Higher Education and Training signed the delivery agreement that set one of the targets to produce 10 000 artisans per year. With adequate funding and concerted effort, the target would see 30 000 artisans produced per annum by 2030 (NDP, 2015). According to QCTO (2015), this target can be reached if the occupational qualifications are implemented to replace Nated and NCV qualifications. Therefore, the purpose of Occupational Programmes was to replace both Nated and NCV programmes. However, colleges that were selected to be Centres of Specialisations continued to offer all three qualifications.

Over a period, however, the Nated qualifications were not updated and when the matter began receiving attention, the Nated qualification was identified as being somewhat out-of-date and that a major revision would be required to bring them up to proper standard (DHET, 2013b). The

Department of Higher Education and Training is currently updating syllabi of some selected subjects in N1 to N6.

The NCV qualification was introduced to TVET colleges in 2007 with 14 programmes in engineering and business studies fields. There are currently 19 NCV programmes that are offered on NQF levels 2 to 4 for over 250 000 students in 50 public TEVT Colleges in South Africa.

Wedekind & Buthelezi (2016) state that, the National Certificate Vocational (NCV) was established as a full-time qualification on three levels of the NQF to provide an alternative pathway to the South African schooling sector. Subject specialisation in a vocational field and fundamental subjects in communication, life orientation, mathematics and mathematical literacy were incorporated in this new qualification.

The NCV qualification was designed with the intent to integrate theory and practice in the curriculum and therefore, was seen as the solution to the lack of practical component for the NATED qualification which had no built in practical components, because it had originally been designed as part of apprenticeships.

The Statistics on Post School Education and Training in South Africa of 2018 DHET (2020) reports that, 'Occupational learning programmes' refer to qualifications associated with a trade, occupation, short courses (accredited or not) part-qualifications, inclusive of workplace based learning (WPBL). All these learning programmes are accredited by QCTO and SETAs (DHET, 2020). The study will discuss the new system of training artisans based on the new occupational qualifications, dual system developed by the QCTO.

The table below shows the different period in which the college started offering the three qualifications.

Colleges	NATED	NCV	OQ
Implementation plan of college: 1	2002	2007	2014
Implementation plan of college: 2	2002	2007	2014

Table 5.1: Year of implementation

The Department merged the 160 previously technical college into 50 Further Education and Training colleges in 2002. At that time colleges were already offering plumbing through the NATED qualification. The NCV was developed in 2006 and implemented in 2007 by all colleges who offer plumbing. The Department selected four colleges to pilot the occupational qualification, dual system to train plumbers and electricians. The Department selected sixteen more colleges in 2018 to continue in the pilot project of training apprentices through the occupational qualification, dual system. Campuses where the dual system was offered were known as Centre's of Specializations (CoS).

2.4. Key Differences across the three Qualifications

The key differences lie in the organisation of time, when and how the practical knowledge is taught, how the assessment is conducted, and the funding model of each qualification.

2.4.1. Organisation of Time

Nated is offered through a trimester system where national examinations are written at the end of each trimester. The curriculum design requires 4 subjects to be taught at each level. The subjects are:

- Mathematics;
- Building Science;
- Building Drawing; and
- Plumbing Trade Theory.

A certificate is issued for students who passed 3 or more subjects in each trimester. There are 3 trimesters in a year which means students can enrol for N1 to N3 in one year. According to Wedekind (2014) the Nated courses were linked to the apprenticeship system. Students who completed a Nated level had a chance to get attached to a workplace through the block release programme in order to complete their courses. The students were eligible to take the trade test after completing 3 years of workplace experience. Some students sign apprenticeship contracts after completing N2 whilst others continue to study up to N6 without being signed up as apprentices. Students who signed up contracts as apprentices before completing N6 enrol for part-time classes in the evening and weekends whilst serving their apprenticeship during the day.

The NCV was envisioned as a full-time qualification on three levels of the NQF which delivered an alternative pathway to the schooling system (Wedekind, 2014). The curriculum design requires 7 subjects to be taught at each level and a certificate is only issued to students who passed all 7 subjects per level. The subjects are:

- Plumbing;
- Construction Planning;
- Materials;
- Plant and Equipment;
- Mathematics,
- Life Orientation; and
- English.

Students must pass all 21 subjects before exiting the qualification in level 4. Students can sign an apprenticeship contract with a relevant company after successful completion of NCV level 3. However, students must complete 3 years of workplace experience before they become eligible to take trade test (Skills Development Amendment Act of 2008, 2008)

Occupational qualifications are offered as 3-year programmes on the system whereby learners rotate regularly between a college and a workplace (Von Maltitz, 2018). The curriculum design emphasises the practical more than the theory. The theory is limited to the trade subject and a small component of Mathematics, Science and Drawing is offered. Students are eligible to take a trade test after 3 years of relevant workplace experience. In fact, for all three qualifications, students cannot take a trade test until they have worked for 3 years as apprentices.

The occupational qualifications are the new qualifications developed under the auspices of the QCTO, mainly replacing qualifications developed through the Standards Generating Body (SGB) processes of the South African Qualifications Authority (QCTO, 2017). The artisan qualifications in the programmes associated with these qualifications are developed through SETAs in collaboration with the National Artisan Moderating Body (NAMB). This is where there is the greatest complexity, combined with this being the primary locus for the development of new qualifications.

The key difference in the organisation time of the three qualifications is the manner in which knowledge is taught in preparation for workplace experience. The time spent in college for theoretical knowledge differs significantly in that with Nated, students spend 3 months for one level, whereas with NCV students spent one full year in one level. Occupational qualification students rotate between colleges and workplaces for 3 years.

2.4.2 When and How Practical Knowledge is Taught

The main point with the Nated qualification is that it was developed with little or no contribution by the industry. This is a qualification developed for TVET colleges to provide theory part of the apprenticeship training, whilst workplaces delivered context-specific work experience (McKerron 1934, cited in Gamble, 2003). The qualification was developed mainly by the Department of Education providing theoretical knowledge to complete the practical component of the qualification at the workplace. In the process, students would be registered as apprentices and end by taking the trade test which would qualify them as artisans.

NCV students are introduced to basic practical experience in the college workshop. The practical component is taught in a simulation environment and a real college workshop. The environment is not necessarily the same as the workplace because there is no production deadline or customers that must be served.

The occupational qualification is designed in a manner that allows students to spend most of the time in the workshop performing practical work. Students perform practical work in the college workshop and spend other time in companies gaining workplace experience. For students who have enrolled through the dual system pilots, at the end of 3 years students are eligible to take a trade test.

In sum, the main difference regarding the way practical knowledge is taught in the three qualifications is as follows: Nated students receive practical knowledge through companies in relevant industries during their apprenticeship training. NCV students receive the basics of the practical at the college workshops. The occupational qualification students who are in the dual system pilot receive their practical knowledge both at college and industry on a rotational system.

2.4.3. Assessment

Nated students are assessed through written national examinations only conducted by the Department of Higher Education and Training. The assessment is quality assured by Umalusi for N1 to N3 and by QCTO for N4 to N6. Students must obtain a minimum of 40% to pass the subject at each level.

NCV is assessed for both practical and theory separately. The combination of the practical mark and nationally written examination determines the final mark for four vocational subjects. The fundamental subjects *(Mathematics, Mathematical Literacy, Life Orientation and English)* do not have a practical component. However, students must obtain a minimum of 30% to pass Mathematics or Mathematical Literacy whilst 40% is a minimum requirement to pass Life Orientation and English. Students must achieve a minimum of 50% to pass each of the 4 vocational subjects (DHET, 2019a)

The Integrated Summative Assessment Task (ISAT) is the practical examination that is performed by NCV students for all 4 vocational subjects. One ISAT question paper is sent to colleges to be used for 3 consecutive years for each vocational subject. For example, Plumbing Level 2 will have one ISAT question paper for 3 years and all other vocational subjects will conduct the same ISAT question paper for 3 years. So, the students know already what is required for them to do in the practical examination in advance. The assessment is quality assured by Umalusi for both practical and written examinations.

Occupational qualifications offered through the dual system pilots require the compilation of the written examination and practical examination in a form of Portfolio of Evidence (POE). The POE is submitted to QCTO for verification of the apprentice's work for the past 3 years. The POE is handed to QCTO together with the results of the trade test.

The key difference in this aspect is how assessment is conducted for different qualifications. For instance, Nated and NCV students are assessed through national examination processes whereas the Portfolio of Evidence is used to compile the work of the student throughout the entire period until the apprenticeship is completed. Furthermore, occupational qualifications offered through the dual system pilots has students who are already employed as apprentices, whilst Nated and NCV students are still looking for a job as apprentices.

2.4.4. Funding

Nated and NCV are funded through the core budget of the DHET whilst the occupational qualifications are funded through different SETAs (Wedekind, 2014). The Nated and NCV students are legible to receive the National Student Financial Aid Scheme (NSFAS) whilst the students enrolled on occupational qualifications through the dual system pilots receive stipends as apprentices from the relevant SETA under which the workplace they are attached to, falls. This is because the funding of occupational qualification is paid through SETAs to firms that employ students as apprentices. A rotational system was put in place at inception of courses to ensure that Occupational qualification and dual system students spend three days at the college and two weeks at workplaces. They rotate their time between the college and industry for 3 years.

2.5. Conclusion

The current situation is that DHET develops the curriculum for both Nated and NCV qualifications and administer their National written examinations. The trade test of the same qualification is administered by employers who are accredited to conduct trade tests and quality assured by QCTO. In this situation, the employers are not involved in the administration of the theory component of the curriculum. Therefore, the vocational curriculum is left to the Department of Higher Education and Training alone whilst the practical knowledge is taught at the workplaces. Hence, the learning gap in the curriculum of both Nated and NCV is identified. However, the occupational qualification requires the involvement of both colleges and industry since students rotate between the industry and college during their training as apprentices.

The key differences between the three qualifications are the roles which are played by each qualification in relation to the training of learners preparing for the world of work. The other difference is the approach to practical knowledge and its relation to theoretical knowledge. The comparison of the three qualifications indicates that there is a need to investigate the weaknesses and strengths of each qualification regarding the approach to practical knowledge and its relation to theoretical knowledge.

CHAPTER THREE: LITERATURE REVIEW

3.1. Introduction

The literature relevant to the study is presented in this chapter. The first section provides the history of technical and vocational education in South Africa. I explain how the Nated qualification started as the first qualification to be offered by the technical colleges in South Africa. It explains that technical and vocational education was developed for white people of South Africa. The second section will look at issues relating to how these qualifications were developed. It explains how the QCTO was established to quality assure the development and offering of the three qualifications. QCTO developed new occupational qualifications to replace the Nated and NCV qualifications. Section three focuses on the overview of the South African vocational education system.

3.2 The South African Vocational Education System

In 1994 the new South African government attempted to build a new technical and vocational education system that included all children without discriminating on basis of race. However, the government inherited the poor skills regime which was based on voluntarism, poor quality and narrow, employer-led definitions of skills (Badroodien, 2004). The Department of Labour (DoL) which was responsible for the training of apprentices through work placement introduced the National Skills Development Strategy in 1997. This strategy led to the establishment of Sector Education and Training Authorities (SETAs). DoL announced that traditional apprenticeship training will be replaced by the new learnership training (Allais, 2012). Therefore, SETAs were mandated to speed up the workplace training for learnership system. The learnership system was intended to recruit learners from secondary schools, technical high schools and technical colleges.

Allais (2006) explains that senior secondary education in South Africa was historically organised into separate institutions for general and vocational education which were offered by schools, technical schools, and technical colleges. 150 racially segregated technical colleges have been merged to form 50 FET colleges with over 260 multi-delivery sites. The infrastructure of TVET Colleges received a substantial boost following the infrastructure recapitalization funding announced by the Minister of Education in the 2005 budget speech (NDP, 2015). According to Wedekind (2014), the recapitalization fund was responding to the criticism that the colleges lack infrastructure and equipment to play the important role in training skilled labour. The White Paper reported that they have subsequently been renamed as Technical and Vocational Education and

Training (TVET) colleges (DHET, 2013b). Schools that were formerly segregated according to race are now multi-racial, but fundamental curriculum change was only introduced in 2006 at a senior secondary education level (Allais, 2006).

According to Allais (2012), the Department of Education was responsible for technical and vocational education delivered through the further education and training colleges, whilst the Department of Labour was responsible for workplace skills programmes, delivered through the SETAs. In 2009, the government created the Department of Higher Education and Training (DHET) under which all skills-related functions associated with the National Skill Development Strategy (NSDS) and SETAs fell (Wedekind, 2014). However, National Development Plan 2030 reports that, in spite of the enormous amount of levy-funded institutions, SETAs have not made a significant improvement to solve the skills development problem (National Planning Commission, 2012). Therefore, the establishment of SETAs did not improve the skills shortages as companies are not taking a lot of students as apprentices.

Allais (2006) further explains that, the Senior Certificate, predominantly obtained in schools (including technical schools), is the qualification which is by far the best known, has the highest stakes and is taken by the vast majority of learners who complete their senior secondary education. It is also important to highlight that, other qualifications have in the main been defined by comparison with the Senior Certificate at this level.

However, the NCV programmes are pitched at NQF level 4 just like National Senior Certificate or grade 12. Therefore, students might perceive NCV as a stronger qualification than Nated and occupational qualification, dual system. It must be remembered that all three qualifications lead to apprenticeship training.

This section includes the whole schooling system starting from the Department of Basic Education. It explains how the TVET college qualifications are registered with the South African Qualification Authority (SAQA). Section four draws attention to the international vocational education and training systems. It explains the global change in the offering of vocational education and training. The global swing that has resonance with the South African context will be explained in this section. Finally, section five provides an overview of research into the relationship between theoretical and practical knowledge literature. In this section, it is illustrated

how theoretical knowledge and practical knowledge supplement each other in the delivery of vocational education and training.

There are different views about the nature and approach of theoretical and practical knowledge which the literature review is going to explore. I will begin the literature review by summarizing the history of vocational education in South Africa.

3.3. History of the Technical and Vocational Education in South Africa

The history of Nated qualification started in the early 1900s when black students were still allowed to register for technical and vocational education. According to Badroodien (2004), the provision of technical and vocational education was regarded as inferior and suitable only for black learners before 1910. However, this changed profoundly after 1910 when the Union Government reversed this policy and provided technical and vocational education to white learners and excluded black learners. Subsequently, it was notable that even in the 1920s when technical and vocational education was solely provided for white learners, it continued to be stigmatized as 'kaffir work' and was looked upon by white people as degrading and unacceptable for white learners (Badroodien, 2004).

McGrath (1996) states that the apprenticeship act of 1922 did not necessarily exclude Africans from apprenticeship. However, there were very few African students who met the entry requirement. This means that the majority of African students did not access apprenticeship training.

3.4. Vocational Education and Training

This section will indicate the global changes in the vocational education and training sector. Kraak (2016) believes that similar institutional pressures and restructuring were faced by almost most college sectors in different countries across the world. These pressures, mergers, management changes and curriculum changes have been highly divergent (Kraak, 2016). This section will highlight only global swings that have resonance with the South African context. Also, McGrath et al. (2019) suggest that, active engagement with the commercial revolution in Africa as well as the relationship between Africa and the rest of the world is vital to the realization of building a transformative vocational education and training.

Nherera (2016) argues that while globalization created new opportunities through liberalised economic systems, only industrialized countries with stable economies benefited. Countries such as Zimbabwe experienced retrenchments, a weak informal sector increased consumer prices and a declined standard of living in general. Another undesirable influence of globalization in Zimbabwe is the diminishing of skill formation. Even though apprenticeship training has been one of the main avenues for skill formation in Zimbabwe, the severe economic climate has led to a reduced number in the intake for such training (Nherera, 2016). The point is that, even if the country has a sound vocational education and training system, if the economic conditions are not attractive for meaningful economic activities, then the system will not lead to fruition.

Allais (2015) states that there are various reasons to consider that not only are the public and economic difficulties encountered by many countries today more than a lack of skills but also that trying to solve them through education may worsen the situation and may cause complications for the education system. So, the vocational education system should not always be blamed for not producing the required skilled workforce, to an extent that it is required to change when the graduates are not absorbed by the economic sector.

Wheelahan (2008) argues that, in Australia Competency Based Training (CBT) does not allow students the opportunity to use the theoretical knowledge that supports the vocational practice, this is because students are not provided with the opportunity to participate in the discussion relating to theoretical knowledge which forms the core of practical knowledge. South Africa had its own experience of the CBT which had to be dropped as it was not effective.

Gamble (2009) notes that, around the 19th century in Britain, it was presumed that natural sciences delivered the reliable knowledge required in craft and technical occupations. Therefore, during this period the knowledge-based approach was the preferred model for the occupational education curriculum. Similarly, the application of knowledge in workplaces or any form of trade was left out of the curriculum, which means that there was no straight linkage relating to theory and practice. This means that employers were only teaching practical that does not have a link to the knowledge acquired in the college. British vocational education and training policy continues to seek fundamental improvement of their system (Addis, 2017).

However, Clarke & Winch (2006) outline the model of learning that is familiar in many European countries such as Germany, the Netherlands and Denmark. The dual system model where apprentices rotate between the college and workplace is popular with these countries.

The section explored the similarities in the provision of vocational education internationally compared to the South African situation. This helped us to understand how the South African vocational education system hook-up with international education. The main point is to understand how the theoretical knowledge and practical knowledge are linked to each other in the training of artisans. The three qualifications differ significantly in the provision of theoretical and practical knowledge. Therefore, the international practices and experiences will help to understand the provision of the Nated, NCV and occupational qualifications with respect to theoretical and practical knowledge.

3.5. The Theoretical and Vocational Knowledge Literature

Because of the significant differences in the provision of theory and practical knowledge for the three qualifications, the study intends to examine the literature of theoretical and vocational knowledge in this section. Gamble (2003) explains that the vocational curriculum needs both conceptual knowledge (context-independent) and practical (context-dependent) knowledge. This section is going to illustrate how theoretical knowledge and practical knowledge complement each other in the provision of vocational education and training. According to Gamble (2009, p.,9), "these two kinds of knowledge are wholly different, and their combination depends on the manner (or not) in which a particular study field draws on formal conceptual or disciplinary knowledge". The occupational qualifications, especially those offered through dual system pilots, intend to integrate theoretical knowledge which is acquired at the college and the practical knowledge which is provided at the workplace.

Clarke & Winch argue that "applied theoretical knowledge consists of both applicable theory and practice appropriately informed by theory. It follows that the applicable theory needs to be taught in a classroom environment where the key propositions and the logical structure of the theory can be laid out and mastered" (2004, p. 519). Importantly, continuous time is devoted to theoretical elements of occupational knowledge to be learned and assessed scientifically.

Wheelahan & Moodie (2016) argue that strong public vocational education institutions are the anchor institutions of their communities that can support vocational education teachers in contributing to local, social, economic and cultural development. This means that the colleges are perceived to be institutions that provide hope for communities to acquire vocational education. Addis (2017) makes the point that what differentiates the epistemic viewpoint of experts is the capacity for learning and not how knowledge is gained. This suggests that, college students would like to gain access to vocational education regardless of the type of qualification provided by these institutions.

However, Addis & Winch (2017) argue that if the learner can be able to repeat the relevant action in a contextually variable situation, then that would be regarded as the proper attribution of know-how. Hence, it should not be reduced to the learner explaining how something is done. So, this shows that practical knowledge is linked to theoretical knowledge and the two should not be separated. Clarke & Winch (2004, p. 515) state that "applied theoretical knowledge requires that workers acquire a body of theoretical knowledge to some extent embedded in practical skills". They further explain that it does not require a particular method of gaining that knowledge. One option would be to obtain theory before putting it into practice. The other would be the creation of theoretical knowledge from practice (Clarke & Winch, 2004). Accordingly, the theoretical knowledge for the Nated qualification is acquired in colleges while practical knowledge is acquired in workplaces. Similarly, there is a close relationship between theoretical knowledge and practical knowledge.

Barnett (2006, p. 146) explains that, "the relationship between disciplinary knowledge and academic pedagogy is familiar, and, subject to the stated qualifications, relatively direct". However, there is a need to consider the operational demands of workplace activities before making links between disciplinary knowledge and vocational pedagogy. Similarly, disciplinary knowledge and situated knowledge do not necessarily mix or easily relate to each other. On one hand, situated knowledge is often stuck within its setting of application, whereas on the other hand disciplinary knowledge in the main aspires to some measure of general applicability (Barnett, 2006). Another point to consider is that situated knowledge is often tacit and challenging to put into words, sometimes even tactile to do a job correctly, and therefore it is hard to codify.

Barnett (2006) suggests that, if the focus is more on vocational pedagogy, then the framing of vocational knowledge for the purposes of teaching and learning must be seriously considered. It is also important to highlight how courses are to be structured, what determines their scope, their duration, how is the knowledge to be subdivided and sequenced? Subsequently, one factor in this is how much time can be set aside for teaching and learning and over what period.

However, theories are interrelated bodies of propositions that have a wide-ranging application that does not only apply to particular cases but too many different cases. Therefore, to learn a body of knowledge of a certain general application within a recognised subject matter is synonymous with learning theory. The two broad ways in which to acquire such knowledge is through learning the propositions that make up the theory, and by learning individual propositions which then form a generalisation through induction.

Gamble (2006) explains that it is concerning if a theory knowledge is based on procedural instead of principled knowledge because this becomes an obstacle for students who are excellent in performing practical work but cannot explain what they are doing in writing. This explains why the theory learnt in colleges should resonate along with the work experience.

Gamble (2006) further stresses that the South African educational system will be effective if the pathways developed are equally strong and if the public has confidence in the vocational route as they have in the general academic route. But, to realise this, knowledge has to be a prominent feature in the vocational route as it is in the general academic route (Gamble, 2006). However, knowledge must be strongly tied to practical work experience to give the vocational pathway a distinctive character.

Wheelahan & Moodie (2016) suggest that the relationship between vocational education and the structures of the labour market need to be reconciled to provide the flexible outcome which the graduates of vocational education want to achieve. However, in South Africa the involvement of labour market actors in the development of curriculum of the vocational qualifications is limited.

Gamble (2009) believes that South Africa tried to address work placement problems that other countries encountered. However, the inequalities created by apartheid in South Africa exaggerated these difficulties (Gamble, 2009). Similarly, the effect of a bad policy will be inflated, because of the uneven and weak educational base from which South Africa began. South Africa started with

many weak and under-resourced TVET colleges, a significant number of under-qualified teachers, and students with low levels of basic education especially in Mathematics and Physical Science (Gamble, 2009). Therefore, it is highly problematic to expect vocational programmes to provide a realistic alternative to general secondary education in a situation where the basic general education of students is extremely poor. Hence TVET college management had to decide on their programmes and qualification mix to offer programmes that they perceive as better than others.

The weakness of the South African vocational education system according to Gamble (2009) is the lack of well-designed learning programmes and well-prepared teachers to teach the required knowledge and vocational skills. It is concerning that a very low number of TVET College lecturers are qualified to teach college programmes. Some lecturers are not pedagogically qualified to teach the theory component of the Nated programme because they were recruited from the industry as artisans. Such lecturers might prefer teaching NCV and occupational qualifications because of the practical component which is their strong position.

3.6 Theoretical/conceptual framework

This section will deal with the distinction between the theoretical knowledge and conceptual knowledge using mainly Gamble's (2003, 2006, 2009) distinction. First of all, as Gamble (2006) explained that it is concerning if a theory knowledge is based on procedural instead of principled knowledge because this becomes an obstacle for students who are excellent in performing practical work but cannot explain what they are doing in writing. This means that the theory and practical knowledge should be balanced. The contrast come from the policy of the NCV in the Subject Guideline (DHET, 2008) which explains that the internal assessment requirement for the theoretical component forms 40 percent of the internal assessment mark, whilst the practical component forms 60 percent. This is the example of DHET prioritising practical component over the theoretical component in the NCV qualification.

The more Occupational Qualification also provide more time for students to spent in industry performing practical work and less time in classrooms for theoretical work. At the end, students perform practical work that they don't master the theoretical component of it. It is therefore important that students understand the theory of the work that they perform.

3.7. Conclusion

In conclusion, the literature in this section shows that vocational education needs both theoretical and practical knowledge to complement each other.

The perception regarding the Nated, NCV and occupational qualification in South Africa could be influenced by the framing of vocational knowledge. Furthermore, NCV and occupational qualifications emphasise practical components.

The three main points are: (a) The Nated programme provides theory component offered by TVET colleges with no practical component. This could influence the decisions of students when choosing the qualification to study. (b) The occupational qualification stresses the practical component more than the theory component. This could be seen by lecturers as a weakness because of the lack of enough theory in the programme. (c) The NCV programme attempts to integrate theory with practical. However, both theory and practical components are constructed on an outcome-based approach, and therefore limit the extent to which students can explore the learning content.

However, in the case of Nated, practical component is taught by qualified artisans in workplaces. The college lecturers teach both theory and practical for the NCV qualification, while practical is taught by qualified artisans in workplaces. Apprentices who use the dual system model for occupational qualifications rotate the attendance between the college and workplace.

CHAPTER FOUR: METHODOLOGY

4.1 Introduction

This chapter outlines the research method that the researcher used to carry out the research study. It also examines the various research elements that the researcher utilised in the study. The key aspects covered in this chapter are research design, sampling methods, research instruments, data collection and data analysis. The methodology section clearly describes the steps followed to carry out the research: it explains that I conducted a document analysis of key qualification and curriculum specification documents, and then conducted 2 one-on-one interviews with college or campus managers. In terms of lecturers, I used a self-administered questionnaire to obtain an overview of their views, as well as conducting two focus groups with three lecturers at each campus. Finally, I conducted two focus groups with five and six students respectively at each campus, representing a spread across the different qualification types.

The data collection devices utilised in this study are also outlined therefore, this section spells out the entire logical plan and approach to gather and analyse information, how it was done, what data was needed and what gathering devices were used. Above all, the section outlines the overall logical plan and approach to obtain and analyse the information. The section also selects the subjects of the phenomenon under study who in this case are campus managers, lecturers and students of TVET Colleges.

4.2 Research philosophy

The interpretivism research philosophy was used in this research. Tashalekori & Teddle (2001) regard the philosophy as intuitively appealing because it emphasises that humans are different from physical phenomena because they create meaning. This philosophy is relevant because the literature review covered many different angles of theories regarding TVET learning in the plumbing discipline. The researcher hence aimed at analysing the findings of theories postulated by scholars who wrote articles on the subject and then consolidate such findings with the researchers' own primary data that was gathered from the field. Because of the facts already stated, the interpretivism approach was seen as the most appropriate approach as it is flexible.

4.3 Research approach

The researcher utilised an inductive approach in this research. According to Gray (2014) an inductive approach is qualitative in nature and always involves the development of a new theory. Furthermore, Collis & Hussey (2014) explain that an inductive approach aims at generating a new theory by understanding the events that human beings attach meaning to and understand the research context.

4.4 Research design

The research design that was employed in this study is the descriptive research design. It was chosen to gather an in-depth comprehension of what takes place concerning the training of plumbers in TVET colleges. This descriptive design enabled the researcher to use different data collection techniques and give detailed explanations on the different data techniques. The researcher cannot control variables but through a descriptive design they are able to give a vivid and detailed report of all occurrences of the past and the present. The research design fully utilised all data collected to identify common issues related to training of plumbers in TVET colleges. This enabled the researcher to make informed statements on findings about the perceived strengths and weaknesses of NATED, NCV, and occupational qualifications in the training of plumbers in TVET colleges.

Cooper & Schindler (2013) suggest that a descriptive research presents a clear picture of specific details of a situation, social setting, or relationship. Cooper & Schindler (2013) further articulate that a descriptive research endeavours to describe characteristics of a population and to determine answers to the questions like who, what, when, where and how? Therefore, the researcher employed the descriptive research in order to do justice to the research.

4.5 Research methodology

The study followed the qualitative research approach. Babble & Morton (2011) describe the qualitative methodology as research method that focuses on describing and understanding as opposed to explaining and predicting human behaviour. Du Plooy – Ciller's, Davis, and Beziudenhout (2014) articulate that qualitative researchers focus at collecting and analysing data through understanding the behaviour of people in terms of their values, rituals, symbols, beliefs and emotions. This research was undertaken using the qualitative approach because of a strong conviction that the qualitative approach will be the best approach through which participants would

feel free to air their views under very few restrictions from the interviewer. When the qualitative approach is used participants are at liberty to say as much as they would like to. The quantitative approach which could also have been an alternative to qualitative research, does not offer the space and freedom to participants to say as much as they would like to say hence this research did not use it and faithfully utilised the qualitative method.

This study is located in the interpretative research models. According to interpretative researchers, there are several socially created actualities. However, the truth depends on the context. According to Wagner et al., (2012) interpretivist believe that values are essential part of social life and that no society's values are incorrect, they just differ. Qualitative research methodologies are preferred by the interpretivists as they gather their information and argue that generalizations is neither possible nor desirable if they do not consider time and context (Johnson & Onwuegbuzie, 2004).

All participants from campus managers, sampled lecturers from the two colleges and the sampled students were all orally interviewed in one-on-one interview sessions with the researcher. The decision to use the oral interviews that were semi-structured was based on the fact that the number of sampled participants from across categories of participants were low. According to Cresswell, Clark, Gruttmann, & Hanson (2011) regardless of the fact that few participants were chosen from each group, the research contends that the information derived from participants is reliable, trust worthy and dependable because the views of a well-chosen sample is representative of the views of the entire population.

Ethics

Participants were asked to give their written or verbal consent before the research begins. Their responses were treated confidentially, and identities (their names and the name of the college) were kept as anonymous. Individual privacy was maintained in all published and written data resulting from the study.

The research participants were not advantaged or disadvantaged in any way. They were reassured that they could withdraw their permission at any time during the project without any penalty. They were informed that there were no foreseeable risks in participating in this study. The participants were not paid for this study.

How Participants were identified

3 focus groups of students were identified due to the qualifications for which they enrolled at their respective colleges. The principals of the two colleges were requested to grant permission to conduct this study.

4.6 Research Population

Tashalekori & Teddle (2001) describe a population as a group of people with specific characteristics that fully attract a researcher to understand that unique characteristic. In this research the population size was 6 lecturers, 12 students and 2 campus managers.

4.7 Sampling

Mugenda & Mugenda (2012) describe sampling as a process of selecting a number of individuals or subjects for a study in such a way that the selected individuals or items represent the larger group from which they were selected. In order to carry out this research the following sample was selected, 6 lecturers, 2 campus managers and 12 students.

4.8 Sampling method

This research used the purposive sampling method to collect data. Cresswell, Clark, Gruttmann & Hanson, (2011) describes purposive sampling as a group of non-probability sampling techniques in which units are selected because they have the characteristics that a researcher would need in the sample. This meant that in purposive sampling units are selected on purpose(Cresswell et al., 2011). The participants were therefore chosen on the basis that they happen to possess vital data on the topic. For information requiring the input of lecturers from Nated, NCV and Occupational qualifications, participants who lectured Nated, NCV and Occupational qualifications were purposively sampled so that they answer to the best of their abilities the questions related to the disciplines the sampled lecturers teach. Purposive sampling was also used to select student's participants from Nated, NCV and Occupational courses. Using purposive sampling also ensured the students selected were studying a course the research interview required their input about.

4. 9 Data Collection Methods

Several sources were at the disposal of the researcher during the data collection process. They included the questionnaire, interviews, focus groups, and policy documents. In this research the following were used to gather information, interviews, and the study of policy documents,

Interviews of sampled participants were carried out using semi-structured interview questions (see Appendices A). The interviews gave the participants the platform to tell the story from their perspective with very few interruptions from the researcher.

4.9.1 Data Validity and Reliability

To ensure valid data and reliable data is obtained, the researcher did the following:

4.9.1.1 Validity

To ensure validity the researcher presented the questionnaire to be used in the research to the supervisor who made some amendments to the questionnaire in order to ensure clarity and relevance of questions asked. As a further test on validity, the questionnaire was also pre-tested by administering it to a few lecturers and campus heads of one TVET college that was outside the delimitation area of the study.

4.9.1.2 Reliability

Saunders, Levis & Thornhill (2017) explain that when a test can be used by different researchers under conditions that are stable and it yields the same or consistent results, it is regarded as reliable. Saunders et al., (2017) further posit that reliability should reflect consistency and reliability over time. The types of data collection instruments as well as the data measurement instruments that the researcher chose ensured the collection of accurate data at the shortest possible time. The data measurement instruments also ensured that the results obtained were consistent whenever used repeatedly when the same participants were used. It can therefore be argued that the researcher took into consideration pertinent issues related to reliability in the research.

4.10 Data Presentation and Analysis

Data analysis is described by De Vos, Strydom, Fouche, & Delport, (2015) as the process of bringing structure, order and meaning to the collected data. Cohen, Manion, & Morrison, (2007)

articulates that data analysis involves interpreting information by sorting, organising and reducing it to manageable fragments.

De Vos et al., (2015) further state that in qualitative research, data analysis does not follow a standardised format that a quantitative research method follows, but it in fact begins at the data collection stage. According to Du Plooy – Ciller's et al., (2014) qualitative researchers blend together data and abstract concepts and ensure that its data are in words that are based on the context of the research.

In order to attain the objectives of this study, all the views of participants were respected and captured according to how participants stated their views. A rigorous probing exercise took place during interviews to ensure participants clarified all their responses. The interviews were also recorded. This approach was meant to minimise or eliminate distortions that would have had a drastic bearing on results.

The most important points raised by the participants were tabulated and coded. This research exercise ensured codes were arranged in themes that were based on the type of similar information that they share. Arranging codes in themes is recommended by (Du Plooy – Ciller's et al., 2014). The researcher then further discussed themes and used verbatim quotes to elaborate them. The researcher also used tables to present the information obtained from the interviews and questionnaires.

The collected data was analysed in this section of the research report. The study summarises how qualitative data was analysed.

The data gathered through interviews with campus managers, lecturers and students were also transcribed. The transcripts and audio recording were archived to preserve the collected data. The audio recording, classifying and evaluating data helped in safeguarding against bias, so as to keep the whole research process valid (Flick, 2009). I converted data collected for this study into electronic format and archived it in password protected files in a personal computer.

4.10.1. Qualitative data analysis

Gibbs (2007) posits that in qualitative research data analysis may be regarded as a careful process of bringing together huge and rough material collected from the field with the intention of reflecting and managing data into a coherent pattern through the analytic process. According to

Gibbs (2007) the analysis of data enables the researcher to refine raw data to make sense out of it in order to determine the underlying of the gathered information. This research used the thematic analysis to process the data.

To facilitate proper data analysis the researcher used the steps of thematic analysis approach that analyses mass qualitative data. The data that were analysed included texts that the researcher studied as well as, the transcripts of interviews. Common themes, topics, ideas and meaning of patterns that recur repeatedly from raw data (Braun & Clarke, 2006). According to Braun & Clarke (2006) the thematic method is very flexible as an analysis method hence as a researcher I chose the method.

I transcribed all the interviews and loaded them onto a qualitative data analysis programme called Otter.ai. I then used inductive coding for the interviews based on key themes from literature on vocational education. The responses were classified according to their similarity.

4.11 Research instruments

The research instruments that the researcher utilised in this research were the questionnaire that was initially filled by campus managers and lecturers. The second instrument was the list of semi-structured interview questions for lecturers, campus managers and lecturers. There was also a list of semi-structured interview questions for students. The researcher also had access to the colleges' archived records which also acted as another primary source that complemented information derived from interviews.

4.11.1 Questionnaires

The researcher used the questionnaire as a research tool. A questionnaire is a set of questions that have scales designed to generate data that is appropriate for further analysis. In this research the researcher carefully constructed and sequenced the questions in order to get in depth information that is relevant to the study from the participants. The questionnaire is comprised of closed ended questions. It is the view of the researcher that the questionnaire gave this study the following advantages; it was cost effective and since the researcher personally delivered it to participants and collected filled copies of it on the same day, it enabled the researcher to get large amounts of information from many participants on the same day. Since the study had a predominant quantitative flair, the questionnaire facilitated an easy analysis of results.

The questionnaire had its own disadvantages though such as the fact that through it a researcher could not fully comprehend the emotions, behaviour and feelings of participants. The interpretation of questions by participants differed and hence responses obtained were based on their own interpretations. This created a certain degree of subjectivity in the way some participants dealt with the questionnaire. It however helped gather useful information in this research.

4.11.2 Interviews

The interview sessions were conducted on a one-on-one basis with campus managers and lecturers in order to gain insightful information about the perceived strengths and weaknesses of NATED, NCV, and occupational Qualifications in the training of plumbers in TVET colleges.

It is thought that as managers of the institutions, campus managers and lecturers have important information that is vital to the research's outcome. The interviews were semi- structured and allowed the researcher to probe participants for further details whenever the answers given were not clear. The probing and quest for clarification that the researcher carried out increased the accuracy of data collected from campus managers and lecturers. This helped the researcher obtain tangible facts that helped answer the main research question regarding the perceived strengths and weaknesses of NATED, NCV, and Occupational Qualifications in the training of plumbers in TVET colleges.

4.11.2.1 Interview with the Campus Managers

I sent letters to the principals of the two colleges requesting to interview the campus managers. These interviews were conducted at different times and different places as the colleges are situated in Eastern Cape and Gauteng provinces. In both situations campus managers came with deputy campus managers for the interviews. Two campus managers and 2 deputy campus managers participated in the study. The interviews with the campus managers were aimed at exploring how they manage funding and other resources of the three qualifications. The interviews with campus managers also intended to find out how the time was spread equitably for the three qualifications. How the staff and resources are distributed to all three qualifications was thoroughly investigated in order to get clarity on the established order as well as the implications of the distribution of personnel and resources on the success of each programme.

The research set out to study the perceived strengths and weaknesses of the Nated, NCV and Occupational qualifications, dual system in training plumbers in the South African TVET colleges in engineering field of studies. So, the campus managers are at the forefront of the offering of the three qualifications and therefore have valuable information to share in understanding the training of plumbers.

Campus managers answered 10 questions regarding the offering of the three qualifications used to train plumbers in their respective campuses. Comparing the offering of the three qualifications in a single institution is the ultimate aim of the study. This comparison would help the study to find out why a particular qualification is preferred over the others.

The following broad themes were used to conduct the interviews with the campus managers:

The views of the campus managers on the offering of three plumbing streams at the same college.

The experience on provision of practical component of the NCV and Occupational Programmes, dual system at the same college.

The experience on the funding of the three qualifications.

The experience on the distribution of work equitably among the lecturing staff of the three qualifications.

The reasons for perceiving the strengths and weaknesses of the three main qualification pathways.

The full interview questions are in the appendix pages.

4.11.2.2 Interview with the Lecturers

Three lecturers who each teach NATED, NCV or OQ were selected from each college to participate in the study. Therefore, six lecturers participated in the study. The researcher had one on one interview sessions with the 6 lecturers who were sampled as participants. A questionnaire was sent to the six lecturers to complete on their own. The questionnaire sought to obtain detailed information on the quality of lectures who teach plumbing either using NATED, NCV or OQ at college level. Following the questionnaire, I conducted focus groups with lecturers. The interviews took place at different places in Gauteng and Eastern Provinces. Lecturers answered 10 set of

questions in each province separately. The questions were related to their experience as lecturers of the qualifications. The questions were aimed at finding out the strengths and weaknesses of the three qualifications especially when offered at a single institution at the same time.

The interviews with lecturers took place in a conducive environment where lecturers were afforded the opportunity to ask clarity questions. The selected lecturers were targeted because they teach specific qualifications and therefore have information that provides understanding of what the qualification basically offers.

Lecturers are well placed to help the study to understand the thinking of students when selecting to follow one qualification to become plumbers over the other qualifications. With their experience of teaching the qualifications lecturers must have seen some advantages and disadvantages of some qualifications over others. It is these advantages and disadvantages that determine the strengths and weaknesses of different qualifications.

The questionnaire was used to determine the views of lecturers who teach the three qualifications separately. The interview questions were conducted under the following wide-ranging themes:

- The views of lecturers about the value to students of each of these qualifications;
- The challenges of lecturers teaching the three qualifications;
- The experience of how the curriculum for plumbing is structured in each of the qualifications;
- The experience of missing topics that should have been included in either of the qualifications;
- The perceived strengths and weaknesses of the three qualifications; and
- The full surveying and interview questions are in the appendix pages.

4.11.2.3. Interview with students

The interview with students were conducted with a focus group of 2 plumbing students from each qualification. This was 6 students from each college and 12 students altogether. However, one student selected not to participate as she was still busy with her files. The students were selected from the three qualifications offering plumbing in the two colleges.

The Occupational qualification, dual system is still a pilot project run by the Department of Higher Education and Training with the National Skills Fund (NSF) carrying the costs for equipment and workshop tools used by the 20 selected TVET Colleges. Despite the fact that the OQ programme is still new 2 students doing the course in each college were interviewed as was the case with the NATED and the NCV students. So, students were selected to participate in the study due to the study qualification they are enrolled in.

All students answered oral interview questions that were semi-structured in nature. The interviewer decided to rely on the oral interviews that were semi-structured because they had the ability to elicit adequate information from participants.

The interview questions were used to determine the type of the students participating in the study and the qualifications they chose. The interview questions were conducted under the following across-the-board themes:

The views of the students on the offering of these three programmes in a single institution. Reasons for selecting one of the qualifications to study towards becoming a plumber. Experience of studying the selected qualification at the college. Similarities and differences in the three qualifications. Perceived strengths and weaknesses of the three qualifications. The full surveying and interview questions are in the appendix pages. The table below shows an overview of the sample used in the research design.

	TVET College 1	TVET College 2
Campus Managers	Interview conducted for 1 campus manager and deputy campus manager	Interview conducted for 1 campus manager and deputy campus manager
Lecturers	Focus group conducted for 3 lectures who each teach Nated, NCV and OQ respectively	Focus group conducted for 3 lectures who each teach Nated, NCV and OQ respectively
NATED	1 student participated in the interviews	2 students participated in the interviews

NCV	2 students participated in the interviews	2 students participated in the interviews
OQ	2 students participated in the focus groups interviews	2 students participated in the focus group interviews

Table 1: Sample size and research design

4.12. Conclusion

The study sought to investigates the perception of lecturers, students, and management of colleges regarding the offering of all three qualifications in a single institution. So, the study required that several students and lecturers be interviewed and analyse their responses.

The study required qualitative research method to be used because it allows the researcher to gather their information and articulate on it from the participants' perspective without generalizing on gathered information (Wagner et al., 2012). Hence, the study required the analysis of the responses of the campus managers, lecturers and students in order to come up with informed decisions or findings.

Campus managers were interviewed to provide information regarding the management of all three qualifications in one institution. Lecturers were interviewed to provide information regarding their perception on teaching the different qualifications. Students were also helpful in providing information regarding their experience on studying to become plumbers using different qualifications.

The study also highlighted the ethical matters that should be taken into consideration when conducting research involving people. The study further considered the research limitation of the researcher as the employee of the Department of Higher Education and Training. Also, the fact that employers of these students were not part of the study, provided some limitation of the research.

CHAPTER FIVE: FINDINGS

5.1 Introduction

The chapter presents the data analysis and the findings from the study and provides answers to core questions raised in the study. The data presented is in the form of responses to questionnaires and interview transcripts. The section commences with the outline of findings related to the biographical information of the participants. Profiles of the participants, starting with the campus managers, the lecturers and students are explained within the biographical information uncovered by the research. An outline of the findings related to the research questions is then made. The phenomenon of interest was the perceived strengths and weaknesses of NATED, NCV and occupational qualifications in the training of plumbers at TVET Colleges. It further focuses on the analysis and interpretations of the findings. In doing so, the response rate is also discussed including data analysis through thematic analysis. The interpretation has been guided by themes which have been established using the research objectives for the study. The discussion of the findings is accompanied by the relevant literature.

5.2 Biographical Information of participants

Three main groups were targeted for data collection namely lecturers, students and campus managers. Below is the biographical information of each of the three groups that were targeted for data collection.

5.2.1 Campus managers

The two campus managers who were participants were both above 40 years. One was 49 and the other was 58. They were both males and had been in the position of campus manager for more than 8 years. Therefore, their long tenure in the office of the campus manager means they are familiar with how courses are administered and taught, and their point of view cannot be overlooked.

5.2.2 Lecturers

Another target group was lecturers who teach plumbing through the NATED, NCV and Occupational Qualification, dual system at the two colleges. One lecturer of each qualification from the two colleges was asked to complete the survey questions. The surveying questions were followed by more intense interview questions with lecturers as a group in separate colleges at

different times. Thus, the interviews were more of focus group discussions. The surveying questions were used to determine the qualifications and experience of lecturers who teach the three qualifications.

Among the lecturers who were selected according to the qualification they teach. Two lecturers teach one of the three qualifications from the two colleges namely NATED, NCV and OQ.

The research found out that 3 lecturers teach the three qualifications and are holders of the National Diploma qualification. Among the lectures 2 lecturers who teach the three qualifications have obtained N4 as their highest qualifications. The figure confirms that 1 lecturer who teaches these qualifications are qualified artisans.'

The lecturers of the three qualifications had different years of teaching experience. 3 lecturers have between 0- and 10-years teaching experience, whereas 1 has between 11 to 20 years teaching experience and 2 lecturers have 21 or more years of teaching experience.

5.2.3 Students

The composition of these students according to gender was 5 female students and 7 male students. This indicates that the number of female students taking plumbing as a preferred trade is increasing hence breaking male dominance in the industry and traditional view that certain jobs are for males only. Out of the 11 interviewed students who enrolled at both colleges to become plumbers, all were black. All students who participated in the study were born in South Africa and therefore hold the South African citizenship.

Among the students who enrolled to train as plumbers, 4 were between the age range of 18 to 24 and 7 were between the ages of 25 – 29 years. Out of the 12 students, 9 stayed in stayed in the township and rural areas of the country. Only 3 of the students who enrolled at colleges to train as plumbers stayed in the suburbs. This could also explain the conception of such jobs as menial jobs by students of the middle-income class who live in the suburbs hence their low enrolment.

One college that was under study was based in the Eastern Cape and where 5 of students' home language was IsiXhosa and one student was Afrikaans. In the other college which is based in Gauteng shows the spread of languages spoken by students. One student spoke Afrikaans, another, IsiNdebele, another spoke IsiZulu, the other spoke Sepedi and the other one spoke Xitsonga. One

student was not interviewed but the college enrolment records indicated that the student spoke Venda.

Regarding the students' highest qualification, this research uncovered the following regarding student research participants. One (1) student was a post grade 9 graduate, 2 were students who completed grade 10, 4 students had completed grade 11 and 5 had completed their matric. Although entry requirement for any for any of the 3 qualifications i.e., NCV, NATED and Occupational qualification is grade 9, the majority of students appear to have been grade 12 graduates when they were enrolled at the college sector for the first time. Only one student as statistics reveals, entered the TVET college sector with the minimum entry requirement of grade 9. This reflects that colleges did not adhere to the entry stipulations. It is possible that the move to enrol post grade 12 learners was meant to boost the pass rate as colleges perceive grade 9, 10 and 11 learners as not good enough for the plumbing courses.

Among the interviewed students from the two TVET colleges, 3 were studying for the NCV qualification, 3 were enrolled for the NATED courses whilst five were enrolled for Occupational Qualification dual system.

5.3 Research related findings

5.3.1 The structure of the curriculum for plumbing in the NCV Levels 2-4; NATED N1–N3; and Occupational qualifications.

The outcomes regarding this research question are outlined in the following order; campus manager's response, lecturers' response and students' response.

5.3.1.1 Campus Managers

Findings from the campus managers regarding the research question was as follows. The campus managers revealed that the current structure was established through document review of the three qualifications. Further interviews were given to campus managers, lecturers and students. The three qualifications are pitched at the same National Qualification Framework (NQF) level 2 to level 4.

The campus managers were also asked what other differences exist between the three qualifications. Two main differences were noticed by campus managers namely the differences in

student exposure and funding of the qualifications. It was established that the NATED students only got the workplace exposure after they had completed the knowledge component, whereas OQ received their workplace exposure immediately after registering with their companies.

The NCV students received the basics of practical at the college. It was pointed out that the two qualifications were funded differently. Therefore, the money to buy equipment and tools for these workshops came from different sources. The NCV and NATED were funded from the ministerial budget voted funds, whereas the Occupational Qualification is funded by the National Skills Fund (NSF). It was therefore difficult to get the money from NSF as it came with a lot of conditions and requirements. It required a lot of paperwork to be completed such as the template indicating equipment which was bought in the previous tranches. The NATED and NCV funds came once as a lump sum for the whole year and could be accessed at any time.

The fact that OQ students were already employed as apprentices, whilst the NATED and NCV students were still hunting for the opportunity to be employed as apprentices showed that the OQ would have an edge over the other two qualifications. The funding of different qualifications shows that the state is taking over the responsibility of industry to fund the training of their own apprentices. Now, with the OQ, the training of apprentices is funded by NSF which is part of the state. Considering that the state funded the same OQ students when they were doing either NATED or NCV before enrolling for OQ, this would constitute doubling funding for the OQ students.

5.3.1.2 Lecturers

5.3.1. 3 Students

The responses from students regarding the structure of the courses have been tabulated as reflected on tables that follow.

The table below shows the similarities between the 3 qualifications.

Similarities	NATED	NCV	OQ

Period to complete apprenticeship	3 years	3 years	3 years
When required to take trade test	End of 3 years	End of 3 years	End of 3 years
Theory component	The same	The same	The same

Table .5. 2: Similarities

The table below shows the similarities between the 3 qualifications as given by students. These findings show that the three qualifications have a lot in common, according to students, especially the period it takes to complete apprenticeship. It takes almost the same amount of time to take trade test and qualify as an artisan.

Similarities	NATED	NCV	OQ
Practical component	At workplace	At the college and in workplace	At both college and in workplace
Period to complete apprenticeship	3 years	3 years	3 years
When required to take trade test	At the end of 3 years	At the end of 3 years	At the end of 3 years
Theory component	Plumbing trade theory is the same	Plumbing trade theory is the same	Plumbing trade theory is the same
South African National Standards (SANS)	Use the same SANS	Use the same SANS	Use the same SANS

Table 5.3: Similarities given by Students.

However, these times are only similar if students get to enrol for the different qualifications at the same time and start the apprenticeship at the same time. In other words, if the NATED and NCV

students start the apprenticeship at the same time after completing N3 and NCV Level 4 respectively, they would complete at the same time. This is the same time that the OQ student would also take to complete the training to become an artisan.

All these qualifications are identical in terms of the period apprentices should take to complete the training and become artisans. The three qualifications are all designed to end with apprentices taking trade test at the end on 3 years. The content of the theory component is the same for the three qualifications. This includes the South African National Standards that govern the plumbing industry.

The table below shows the differences between the 3 qualifications.

Differences	NATED	NCV	OQ
Minimum entry requirement	Grade 9	Grade 9	N2 / NCV L3
Practical component at college level	Not a requirement	A requirement	A requirement
Workplace Requirement	Separate from college time	Separate from college time	A requirement during college time
Assessment of knowledge component	Administered by DHET	Administered by DHET	Administered by service providers at college level
Apprenticeship model	Apprentices are release by their companies to attend knowledge component in colleges for 1 trimester/ annum	No student serves apprenticeship and enrol for NCV at the same time	Apprentices rotate between college and industry throughout the year

Period to complete knowledge component at college	Trimester, takes 1 year to complete N1 – N3	Takes 3 years to complete Level 2 – Level 4	Takes 3 years rotating between industry and college

Table 5.4: Differences

These findings show that there is inconsistency regarding the entry requirement for the three qualifications. Although the policy of the Department indicates the grade 9 as the entry requirement for all three qualifications, colleges applied used their own policies to admit students in the different qualifications. The significant difference is the entry requirement of the OQ, as it requires students to have gone through either NATED or NCV before enrolling as OQ student.

5.4 Practical and Workplace Component of the Qualifications

5.4.1 Responses from campus managers

The details of the practical workplace component of qualifications were sought from campus managers and they confirmed the following: the NATED qualification does not have a practical component that must be taught at the college. The design of the NATED qualification is such that the practical component will only be taught at the workplace when students serve apprenticeship. Some students go all the way from N1 up to N6 before engaging in any practical component. Only after obtaining N6 certificate, they start serving apprenticeship and qualify as artisans. Some NATED students were recruited by companies to serve apprenticeship before they enrol at the college for N1. In that case companies release the apprentice to attend the NATED qualification for one trimester per annum. This would be repeated for three years until the apprentice obtain a minimum of N2 certificate and qualify to take a trade test.

On the other hand, NCV qualification requires students to acquire the practical and theory component when attending at the college. It was designed to include workplace exposure where students should visit industry to perform basic and practical work. This workplace exposure was supposed to happen during the college holidays for 5 – 10 days, but because of lack of industry spaces, it is not happening. As a results, colleges no longer enforce the workplace exposure for NCV students. This means that, the qualification is no longer offered the way it was designed for.

The Occupational qualification, dual system is designed such that theory, practical and workplace components are provided in both industry and at the college. The workplace requirement is enforced because the students must first be employed before enrolling at the college. This workplace requirement reduces the number of students that could be enrolled at the college drastically because; only a maximum of 15 students per group could be enrolled at a time. The other difficulty is that because of shortage of workplaces few apprentices participate in the Occupational Qualification, dual system.

The campus managers were further asked how they provided the practical component to the three qualifications. For the first campus manager students shared the workshop and rotated according to the scheduled timetable. However, each qualification used separate lecturers, so students did not mix. The second campus manager stated that the campus had two workshops, one for NCV and the other for OQ. Separate lecturers were used in separate workshops. Students and lecturers of the two qualifications do not mix.

On the other hand, the Quality Council for Trades and Occupations (QCTO) requires the colleges which offer the OQ to assess the knowledge component and place the results in the portfolio of evidence file. The practical assessment, which is the trade test, must be conducted by the accredited trade test centre and the results be placed in the same portfolio of evidence file. The portfolio of evidence file is then sent to QCTO as the statement of results. The concern with this is that there are no standardisations of the theory assessment. There is no guarantee that lecturers of the students would assess the same knowledge component using the same standard.

Out of 6 lecturers, 4 strongly agreed that they provided feedback to students after conducting learning assessments. These assessments formed part of the portfolio of evidence which was required to be provided at the end of apprentice training for OQ students. The results of these assessments were used as part of the internal continuous assessment (ICASS) which was used as term marks for NCV and NATED students.

5.5 Explanation of the Learning and Teaching Process

5.5.1 Campus Managers' response

According to the campus managers, one lecturer had an allocation of 4 subjects per level at NATED, 7 subjects per level at NCV and 2 subjects per level at OQ. The campus managers were asked to explain how they distribute the workload of lecturers. One alluded to the fact that lecturers of OQ shared the content of the syllabus. When one lecturer taught the module the other one assessed, and they rotated their roles in different modules of the syllabus. The other manger stated that he allocated workload of the staff according to the qualifications that they taught. Each NCV lecturer taught four subjects in one level, so 3 lecturers were allocated four subjects in level 2-level 4 respectively. The fourth lecturer taught the fundamental subjects in each level.

Thus, the two campus managers agreed that in NATED, one lecturer is allocated four subjects in each level. So, there are three lecturers who teach N1 – N3 plumbing. There are two lecturers who teach OQ for the two groups. When one group is at the college for theory and practical the other group is in industry for workplace experience. The groups rotate between industry and workplace using the agreed rotational timetable.

NCV and NATED could accommodate more students in a group than the OQ. This means that if colleges were to drop both NATED and NCV, less students would be enrolled in TVET colleges. This also would mean that the number of people who are not in education, employment and training would be increase.

5.5.2 Responses from lecturers

5 lecturers stated that they teach the entire group of students in class more often than in a workshop equipped with practical tools and equipment. However, One lecturer revealed that they spend more time with learners in the workshop than in class. This shows that when students are at college, including the OQ students who alternate between college and industry, they are mostly taught using methods that are more theoretical than practical.

According to all participating lecturers, students preferred to work as teams and no student would like to work alone. This shows that the plumbing trade is a group-oriented work in nature. The lecturers revealed that presentation by students was one of the strongest learning mode of students as 100% of the students engaged in class presentations.

The lecturers also outlined that 33% of students they taught, liked project learning activities whereas 67 % of students performed more practical work in the college workshop. 33% of the students do not perform practical in the college workshop at all. These would be the NATED students as the qualification does not require practical component.

5 lecturers strongly agree that syllabi of the three qualifications cover all aspects of the plumbing theory. This means that to them the theory content of the plumbing trade is similar. One lecturer, however, did not see the semblance in the theory content of the NATED program as unique. 5 lecturers disagree with the notion that there is no academic support for struggling students. However, One lecturer believes that struggling students do receive academic support. 4 lecturers strongly agree that they provide immediate feedback to students after conducting assessments. 2 lecturers believed their feedback was not as immediate as the college expects them to. The assessments in question form part of the portfolio of evidence which is required to be provided at the end of apprentice training for OQ students. The results of these assessments are used as part of the internal continuous assessment (ICASS) which is used as term marks for NCV and NATED students.

4 of the lecturers also strongly agreed that students work together as a team in different projects. This means that both OQ and NCV students do work together for practical projects that are conducted at the college. This is inconsistent with the fact that NATED students do not perform practical work when at the college and therefore, do not have to work together for different projects.

All the 6 lecturers were of the opinion that their colleges fall among the 50% national figure of colleges that were found to be using the interactive white board when delivering lessons. Therefore, this means that lecturers can conduct lessons with students in separate venues. It also means that 50 % of colleges are not using the interactive white board.

5 of lecturers strongly agree that syllabi of the three qualifications cover all aspects of the plumbing theory. Regardless of the fact that Nated is a Trimester course and NCV is a full year course, findings from 5 of the 6 lecturers reveal that if a student pursues their course right up to the end, they will ultimately cover more or less similar theory course content of the plumbing trade. One lecturer however was of the opinion that the NATED syllabus was not as detailed as the others and

one cannot guarantee that the NATED syllabus would meticulously cover all aspects of the syllabus as the NCV one.

5.5.3 Responses from students

The responses of the 12 students revealed that 10 students sometimes did work on their own, without the help of lecturers.

However, 2 students said they preferred working in groups. This shows that the majority of students appreciate the fact that sometimes it is beneficial to do tasks on their own in order to complement class work. It may not always work to the advantage of the student to have lecturers around to show them how to work all the time. Some self-discovery exercises are necessary for one to master what they learn.

All students indicated that they have laptops that they use when at college. They also have kindle or tablets. All 11 students indicated that they have access to internet connectivity. Among the student participants, 6 students confirmed that they have access to interactive white board whereas the other 5 students indicated that they do not have access to the interactive white board. This shows that colleges are not operating at the same level of technological access and usage. However, the responses of students revealed that all colleges have access to the data projector.

5.6 Resource Allocation and Access to Resources

Learning material or resources are a requirement for any learning institutions. These include books, practical material and personnel protective clothing in institutions where practical is done. Often students of TVET colleges do not have the required learning material in their respective programmes. In this study almost all students indicated that they have textbooks. 81% indicated that they had access to books. 64 % of students had drawing instruments and calculators. This equipment is important for students who are training to become plumbers.

Personal Protective Equipment (PPE) are required in the workshops for the NCV and Occupational qualification. So, all students indicated that they had PPEs. The only student who did not have the PPE is registered for NATED because it was not a requirement. While the world is moving to the Fourth Industrial Revolution the use of computers has become inevitable. Out of the 12 interviewed students, 8 students stated that they had used the computers before enrolling with their colleges. The remaining 4 students indicated that their first interaction with a computer was at their

current colleges. Regarding access to computer laboratories, 9 out of 12 students revealed that they had had access to computer laboratories before enrolling at their present colleges. The other 2 students said they had never been to a computer laboratory before enrolling at their colleges and 1 student said they are not sure whether the small room where they had access to a computer can be classified as a computer laboratory since the room did not have more than one computer and had no other gadgets that a conventional computer laboratory is equipped with. Regarding internet connectivity, 10 students said they are always connected to the internet and 2 said they are only connected to the internet when they are in the college computer laboratory as their phones are not smart phones.

When asked how the resources were allocated for the three qualifications, campus managers responded by alluding to the fact that they developed a cash flow process that indicated how much the college utilized per annum. The procurement of tools and equipment was informed by the cash flow process. So, resources were allocated according to the fund received for a particular qualification. Resources were not mixed. Each qualification used its own resources such as workshops, equipment, tools, computer labs and classrooms.

NCV is funded more than NATED because of its requirement for practical component. Although the head count of NATED is more than that of NCV and OP, its funding is less. The NSF grant comes with line items that indicate what needs to be bought for theory component and practical component.

The NCV and NATED were funded from the ministerial budget voted funds, whereas the Occupational Qualification is funded by the National Skills Fund (NSF). It was therefore difficult to get the money from NSF as it came with a lot of conditions and requirements. According to campus managers NCV was funded more than NATED because of its requirement for practical component. Although the head count of NATED is more than that of NCV and OP, its funding is less. The NSF grant comes with line items that indicate what needs to be bought for theory component and practical component.

5.7 Challenges in the Teaching and Learning Process

5.7.1 Lecturer Responses

Some of the challenges experienced in the teaching programme was that learning material or training manual for OQ does not have full information regarding the teaching of plumbing. To quote one of the lecturers, 'The challenge is that we must go out research more information before teaching certain modules of the training. We must make copies for students to compensate the weak OQ training manual that is provided for students. It takes time to collect this extra information from other sources. It is also difficult to get the training manual for students. It takes too long before students could receive the training manuals for OQ.'

The other challenge mentioned by lecturers Is the rotation between industry and college. Lecturers revealed that when the OQ students are in the industry, they don't cover all aspects of practical training. Some companies specialise on one or two components of practical training. Students spent most of the time performing same practical aspects and don't get exposure to other aspects. There is a need for host employer to take students for apprenticeship. Lecturers revealed that some OQ students are placed in workplaces like hospitals where they are only involved in maintenance part of the training and never get exposure to working with big structures of the plumbing trade. The other challenge is that when industry runs out of projects to keep OQ students busy, they ask students to perform tasks that are not related to plumbing such as packing stuff, delivering goods to different destinations, washing cars etc. So, companies do not stick to the curriculum. The lead employer does not rotate the OQ apprentices around the different host employers to gain exposure in other aspects of the training. Host employers were supposed to be called to one room and agree with the lead employer that the apprentices are going to be rotated among themselves to expose them to all aspects of training.

Lecturers also revealed that there is little time to complete the NCV syllabus. The content and practical time is not adequate for the long NCV syllabus taking into consideration that plumbing is not done in isolation but with 6 other subjects. Regarding NATED, the lecturers stated that it is difficult to teach the NATED theory component that leads to practical, because there is nothing that can help the lecturer to demonstrate how the components of the plumbing trades operate. For example, when a lecturer wants to demonstrate how to install a shower in a bathroom, there would be no shower to demonstrate.

Out of the 6 lecturers who were participants in this research 5 were of the opinion that full academic support has always been given to struggling students whereas one lecturer was of the opinion that struggling students were not given enough academic support.

These findings show that the experiences of lecturers indicate that although OQ is desired and supported by lecturers as a qualification, it has more challenges than NCV and NATED programmes as experienced by lecturers. The fact that OQ apprentices do not get exposure to all aspects that are a prerequisite to training plumbers means it is not holistic in its present form. A holistic approach to course coverage, is very important in all disciplines.

5.8 How to Overcome these Challenges?

5.8.1 Responses from lecturers

All lecturers suggested that copies of the OQ curriculum documents should be provided to companies. The lecturers felt this would ensure that they know which aspects of the training should be followed and taught at their workshops. Lecturers were all of the same view that companies should be screened first before they take students for apprenticeship to check if they have the capacity to train apprentices in all aspects of the plumbing trade. The lead employer should agree with different companies that apprentices will be rotated among different companies to gain practical exposure in all aspects of the plumbing trade.

Lecturer '1' said that they used the topic weighting to allocate time to be spent on each topic for NATED.

Lecturer 5 and 6 indicated that they depend on the weighting of the NCV subjects to determine the pace of teaching their theory component. This helps them to spend adequate amount of time on each topic. Lecturer 5 and 6 responses reveal that there is no link between colleges and prospective employers or the workplace during the teaching of the theory component of the NCV course. The finding exposes the shortcoming of the lead employers as they could not ensure that the theory component received by prospective apprentices whilst at college is in line with what apprentice courses the industry offers demand.

Lecturers were asked to indicate if they received sufficient support from their campus managers as they teach the three qualifications. All said the support they get is not adequate at all.

5.9 Strengths and Weaknesses of the System

Students listed the following as the strengths and weaknesses of the three qualifications.

Strengths / Weaknesses	NATED	NCV	OQ
Strengths	It's nice and short	There is more time for theory and practical	Workplace experience
	It's a foundation for university articulation	Its equivalent to NSC at NQF level 4	We learn new things at industry that we didn't learn at college
	With the addition of two languages to N3, can obtain National Senior Certificate	Can further education at university.	Quicker to take trade test as we are already serving apprenticeship.
Weaknesses	No practical component at the college	It takes too long to complete	Lecturers are not competent enough to teach the OQ
	Difficult to find a company to train as an apprentice.	It is not recognised by companies	Companies not knowing how to treat apprentices, they treat us like labourers instead of apprentices
	Syllabus is old.	Lecturers don't know how to teach practical component.	Our attitudes changed after we were treated badly by the employers.

	Uses old technology.	Finding firms to join as an apprentice is very difficult.	The supervisor's attitudes towards apprentices are as if they want you to quit, and we think their attitudes becomes hostiles after they have learnt that we also have N6 qualifications, something that they don't have.

Table 5.5: Strengths and Weaknesses as Seen by the Students

Lecturers were asked to indicate the strengths and weaknesses of the three qualifications.

Strengths and Weaknesses of the Three Qualifications

Strengths / Weaknesses	NATED	NCV	OQ
Strengths	The cycle is quick	Practical component	Training at the college
	Strong and rich knowledge component	The basic practical component helps students to start own businesses	The practical component that is not taught by industry is taught at the college. The college is required to cover all aspects of the training
	Qualification can be offered on part time basis.	Students can visit companies for workplace exposure during the college holidays.	Students of this qualification are already employed by their different companies.

Weaknesses	No practical component	Takes the whole three years to exit.	Lead employer does not support the apprentices by responding to queries that they have regarding training.
	Teaching the qualification without the slightest chance of performing a practical task is a major weakness.	Difficult to teach both practical and theory at the same time.	The lead employer only conducts their associate companies to be the host employers.
	The syllabus is old, it requires updating.	Not enough time to complete the practical component	Lead employer does not look for companies and sign students for apprenticeship training, instead it blames colleges for not finding host employers.

Table 5.6: Strengths and weaknesses

These findings show that DHET, Industry, QCTO and other stakeholders need to come together to agree on the rotation of apprentices among companies to cover all aspects of training apprentices. Even employers that are not part of any association should be given the opportunity to become the host employers. Lead employer should ensure that companies that are going to play the role of the host employers can train apprentices in many major aspects of plumbing trade.

All lecturers stated that the NATED students were exposed to the basics of the trade in the beginning and moving to challenging aspects in the middle years up to more difficult part of the trade in the final year. On the NCV course all lecturers agreed that the knowledge and practical component of the NCV imparted at college, provides students the opportunity to feed into the industry environment easily. The curriculum of the OQ was structured in such a way that students had enough time to complete practical work when at the college. Students who joined OQ after completing NATED found the theory component boring as they had covered it before. Students who joined OQ after completing NCV, found the practical and theory component at college as a waste of time because they covered all that before.

The findings showed that there is a problem of repetition of either theory and / or practical if students who are recruited into OQ have completed NATED N1- N3 or have completed NCV Level 2 – Level 4 qualifications. Students who enrol for OQ should come from grade 9 as per the minimum entry requirement for this qualification.

5.10 Reasons for students to choose one qualification over the other.

5.10.1 Lecturers' response

According to lecturers, students see the opportunity of getting permanent employment after completing the OQ. Their CVs will show that they have received the training that comprises of the workplace exposure and that is seen as an advantage to them. OQ provides more knowledge to students because of its requirement for theory, practical and workplace exposure. After discussing the strengths and weaknesses of the three qualifications, lecturers were asked to indicate what needs to be changed when training apprentices to be plumbers. As indicated above, all three qualifications have strengths and weaknesses, so, something need to be changed.

5.10. 2 Students' response

All students who enrolled for OQ confirmed that they viewed their course as a clear opportunity to eventually getting permanent employment once they complete the OQ course. Therefore, it is the reason behind the students choosing OQ instead of *NATED or NCV*. These findings reveal that OQ is the preferred qualification because it provides students the much-needed work experience that is usually demanded by prospective employers.

However, there was a mixed feeling from among students about their qualification. Most students seemed to favour the qualification they were enrolled in. However, findings showed that some students would enrol for one qualification after another although they were repeating the same components and were also repeating the same NQF level. Most students' current enrolment was not well informed or was based on their circumstances. While some had failed to secure a place at university others were limited by resources. However, only a few students saw a competitive advantage on the qualification they chose. 8 students showed passion for the trade despite their different circumstances of entering various courses. They believed they were neither pushed by their parents or friends to the trade. Only 4 believed that they had no other choice hence they were forced to take up these courses.

5.11 Proposed Changes

The table below shows what should be changed according to all lecturers and campus managers.

What could be changed	NATED	NCV	OQ
Syllabuses	Syllabus is too old, it requires revision.	Although NCV is relatively new compared to NATED, it too requires regular updating. It must be modernised to include content like 4th industrial revolution	The training manuals are used as the learning material and are produced as the training proceeds.

			Procuring Process takes too long to complete due to NSF requirements.
Industry involvement	Industry involvement in the design of curriculum is required.	Industry involvement in the design of curriculum is required.	Industry involvement in the design of curriculum is required.
Trade testing			Colleges should be allowed to conduct trade test at their credited workshops.
			Colleges need to acquire workshops separate from the one used for training. These workshops should be used to conduct trade tests.
Legislation			Companies should be forced to train a certain number of apprentices through legislation.

Table 5. 7: Suggested changes

5.12 What need to be changed to Train Plumbers according to lecturers?

5.12.1 Lecturers' response

Regarding OQ lecturers were of the opinion that workplace attachments need to be controlled better. In other words, there should be a place where apprentices could report ill treatment by host or lead employers whenever they feel aggrieved. For example, apprentices should be able to report

to a body whenever they are asked to perform tasks that are not part of the training without fear of been reprimanded or fired for reporting.

Companies should be monitored that they comply with the regulation to train apprentices according to the agreed conditions and rules of engagement. If they don't have the capacity to train other aspects of the training, they should find alternative employers who can complete the training of apprentices. Similarly, when apprentices prepare to take trade test, it is companies that must make sure that their apprentices are properly prepared to have a reasonable chance of passing the trade test.

The syllabus of OQ is too long to be covered in three years. The length of training plumbers should be extended to 4 years instead of the current 3 years. Students are rushed through difficult modules because lecturers have pressure of completing the training in the given time. Lecturers also called for the inclusion of water leak detection course at OQ as they felt it is a new technology which an ordinary plumber should learn.

On the NATED course lecturers felt a short practical component should be introduced for the NATED qualification. This practical component should be added after students have completed N3 and have never been to industry for workplace exposure. They also suggested that Solar Water Heater (SWH) should be included in the NATED syllabus because it is a new technology that has just been introduced in the country in the recent years. It is currently learnt as a special skill that students do on their own after they have qualified as artisans.

On NCV, Lecturers 5 and 6 suggested that the syllabus of NCV should be reduced to allow time to teach both practical and theory components. They called for more time to be allocated to the practical components of the course. Furthermore, some lecturers felt that there were topics that could be included in the curriculum. Gas geysers should have been added in the NCV curriculum documents as the new technology in the plumbing trade.

These findings show that even in the latest qualifications like NCV and OQ there are gaps regarding the latest technology that needs to be closed.

The findings show that the administration of apprentices at industry level need to be improved. Lecturers indicated that some companies are not able to cover all practical component during the workplace experience period. Apprentices had to find places in other companies to complete the

practical component that is not covered in their original companies. There are too many gaps that need closing regarding the training of apprentices is South Africa.

5.13. The Structure of the Curriculum in Each Qualification

5.13.1 Lecturers' response

Lecturers stated that the NATED students are exposed to the basics of the trade in the beginning and moving to challenging aspects in the middle years up to more difficult part of the trade in the final year.

On the NCV course lecturers felt the knowledge and practical component of the NCV learnt at college provide students the opportunity to feed into the industry environment easily. They said it is regrettable that the industries at present do not appreciate the quality of the NCV course.

On OQ curriculum, lecturers felt the curriculum of the OQ is structured in such a way that students have enough time to complete practical work when at the college. Students who joined OQ after completing NATED find the theory component boring as they have covered it before. Students who joined OQ after completing NCV, find the practical and theory component at college as a waste of time because they covered all that before.

The findings show that there is a problem of repetition of either theory and / or practical if students who are recruited into OQ have completed NATED N1- N3 or have completed NCV Level 2 – Level 4 qualifications. Students who enrol for OQ should come from grade 9 as per the minimum entry requirement for this qualification.

Lastly, lecturers were asked to indicate if there are any topics in their respective qualifications that should be included to enrich the curriculum. Lecturers provided the following responses.

5.14 Any Topics that should be Included in the Qualification

5.14.1 Lecturers' response

The 2 NATED lecturers believed that the Solar Water Heater (SWH) component should be included in the NATED syllabus. The lecturers articulated that the solar water heater (SWH) component is in line with the Fourth Industrial Revolution (4IR) and the innovative technology that accompanies it. The lecturers felt to demand that students cover the SWH component on their

own after they qualify as artisans is an injustice because the college should move with the times and offer wholesome courses. On the other hand, the 2 NCV lecturers who were participants in this research called for the inclusion of a component related to the operation of gas geysers within the NCV curriculum. According to the 2 NCV lecturers, is a new technological component within the plumbing trade and is in tandem with the dictates of the Fourth Industrial Revolution. The two lecturers who teach OQ felt the syllabus for OQ must also include water leak detection component as part of the study for plumbers.

These findings show that even in the latest qualifications like NCV and OQ there are gaps regarding the latest technology that needs to be closed.

5.14.2 Campus managers' response

Campus managers were asked what they think should change regarding the way the three qualifications are offered by the South African TVET colleges. The fact that NATED syllabus is too old means that old methods and techniques of training apprentices is used. This means that the theory is not aligned to the practice applied in industry. The immediate change that is required is to revise the NATED syllabus in big scale.

The campus managers suggested that industry should be involved in the revision of the NATED syllabuses. The involvement of industry would ensure that the theory and practice in industry are aligned.

Regarding NCV the campus managers acknowledged that although NCV is fairly new compared to NATED, it too requires regular updating. The qualification was implemented in 2007 and only few subjects were updated since then. The fact that DHET does not update syllabuses regularly shows the weakness in the curriculum development system.

The non-involvement of industry in the development of NCV is also cited as the matter that should change. Although some companies were involved in the drafting of some NCV programmes, consultation was not wide enough to include most of each sector.

The training manuals are used as learning materials in place of textbooks that are used in both NATED and NCV. The problem with this is that the equivalent of knowledge component that is found in the four textbooks of NATED and 7 textbooks of NCV qualification would be missed in the OQ qualification. This is because only one learning material which comprises mainly of the

plumbing theory is used. Subjects like mathematics, science and drawing are not fully included in the learning material. Campus managers suggested that this should change and include more knowledge component.

Although industry is involved in the offering of the OQ, they were not involved when the learning material was developed. However, they are training apprentices the way they used to train them in the past. What campus managers are asking is the involvement of industry when the content of the learning material is developed.

The campus managers understand that colleges are not accredited to conduct trade tests. Very few colleges have since applied for the accreditation to conduct trade test. However, the numbers are so small that it does not make significant change in terms of the time apprentices wait to get the trade test dates. Therefore, what should change is that more colleges should be accredited to conduct trade tests in their own workshops.

5 15 Weaknesses and strengths

A number of weaknesses and strengths were established concerning the curriculum. Firstly, the research established that industry involvement in the design of the curriculum was required for all 3 qualifications. Nated syllabuses were seen to be too old and needed constant review to match with the emerging demands of the industry to include the content of the 4th Industrial Revolution. While the training is supposed to offer some practical component of training in NCV and OQ courses, it did not cover all the aspects of the practical component thereby leaving a gap for students that needed to be filled in the industry. There is no proper co-ordination between the colleges and the industry for a better flow of students from the college. No attachment places were given to students. This is an important element that could see students improve and making it in the industry. While theory was covered adequately, the practical component was not given enough time. It needed to be given enough time in order to be done justly.

More specific findings were made on each of the three qualifications. The fact that the entry requirement for the OQ is grade 9, students are required to produce N2 or NCV Level 3 certificate before enrolling for the qualification shows inconsistency in the application of the enrolment policy. This simply means that students must first obtain either NATED or NCV qualification before enrolling for the OP, dual system. Students can obtain N2 after 2 trimesters or can choose

to follow the NCV qualification and obtain NCV Level 3 after two years of studies. This finding is concerning, because students would need two of the qualifications to qualify as a plumber. It doubles time of students to qualify as plumbers and it cost the state double the amount of training plumbers in the South African TVET college system.

The campus managers agreed that in NATED, one lecturer is allocated four subjects in each level. So, there are three lecturers who teach N1 – N3 plumbing. There are two lecturers who teach OQ for the two groups. When one group is at the college for theory and practical, the other group is in industry for workplace experience. The groups rotate between industry and workplace using the agreed rotational timetable. This finding shows that campus manager can account and utilise to the maximum the lecturers at their disposal.

The fact that NATED is structured in such a way that it allows students to enrol as part time students while working at the same time makes the qualification popular among the working students. This encourages students to study even after they met the entry requirement to take trade test and become artisans. There is a finding that NCV is seen as the better qualification for students to acquire the matric equivalent qualification at NQF Level 4. This shows that students who would like to further studies beyond artisanal qualification could benefit from doing NCV. It is apparent that NCV was developed to be an alternative for students who did not want to follow mainstream academic grade 10 to 12. Students who wanted to follow the vocational stream should enrol for NCV and decide after Level 4 to further studies in institutions of higher learning or follow the apprenticeship option.

The fact that NCV provides theory and practical component which afford students skills to perform certain basic plumbing work means that they can start small businesses. This tells us that the graduates of NCV have possible options of a) continuing with the trade by serving apprenticeship and qualify as artisans; b) depending on the marks obtained, enrol at a university of technology to further their studies; c) further studies by enrolling for N4 – N6 and obtain a National N Diploma which is pitched at NQF Level 6; and d) start own business using the practical knowledge that they gained at the college workshop. These facts are important for students when deciding which qualification to choose when arriving at the college. This is seen as a strength for the NCV qualification.

The fact that the OQ students are already employees of their different companies means that they have achieved what other students are still striving to achieve. This fact alone shows that students of this qualification have started ahead of the other qualifications in terms of job seeking process.

However, the OQ is difficult to join as only 15 students can be registered to be in the workshop at a time. So, the competition to get a space in the qualification is tough. So, if the number of students who can be enrolled for OQ is that low, how many can be enrolled in a college? How many lecturers could be employed to teach that low number of students? These questions reveal that the use of OQ to train apprentices can reduce the number of lecturers required in each college drastically. Colleges are used to enrol 30 to 35 students in a class and employ many lecturers to teach hundreds and thousands in the campus. If colleges use OQ to train students, some lecturers would not be required to teach at the TVET College because of the reduced number of students.

The finding that 50% of lecturers who teach the three qualifications have obtained National Diploma as the highest qualification is worrying considering that knowledge component is just as important as the practical component. The knowledge component of the NATED and NCV lecturers could weaken the qualification if they are not well qualified to teach these qualifications.

The findings also reflect that out of 6 lecturers in the sample group who teach the three qualifications, 2 have obtained N4 as their highest qualifications. Furthermore, all lecturer who teach these qualifications are qualified artisans.

The finding that although OQ is a desired qualification by lecturers, they expressed concern that the OQ has more challenges than the other two. The concern is about the apprentices who are not getting exposure to all aspects of training plumbers. The lecturers are informed by their apprentices when they come to college for knowledge component.

These findings show that colleges and industry do not communicate on how learning for the OQ students should take place when students are at industry. This also exposes the shortcoming of the lead employers as they could not ensure that apprentices receive adequate training when in industry. This finding weakens the OQ as it does not happen when apprentices spend all the time at industry and only released for a trimester to attend knowledge component at colleges under NATED qualification. When students come back from the college, they are put on the production line under the supervision of the dedicated mentors.

From the interviews with college principals, it became apparent that 45% of the students who enrolled at TVET colleges to train as plumbers are females. This finding was further corroborated by the enrolment statistics that the colleges provided to the researcher to scrutinize or inspect. The high number of female students is encouraging and bodes well for the future. This indicates that the number of female students taking plumbing as a preferred trade is increasing. This shows that in near future the number of female and male artisans would be equal. This would be in line with the UNESCO's goal of increasing the number of women participating in engineering sector.

The enrolment records that the researcher went through during their assessment of college records also reflect that 55% of students who enrolled to train as plumbers are between the ages of 25 – 29 years old. All these students who participated in the study were born in South Africa and therefore hold the South African citizenship. It is encouraging to observe that young people are participating in the training to become artisans.

The fact that colleges use different media to advertise programmes and qualifications they offer is encouraging as they reach more potential students to come to the college. On the other hand, the lead employers like the Institute of Plumbing South Africa (IOPSA) advertise training opportunities for students who want to train as plumbers only. This is understandable because IOPSA is the association for plumbing industry. This finding is important to acknowledge the different ways used by colleges to attract students to their campuses.

These findings show that students did not have all information regarding the qualifications for which they wanted to enrol. This finding shows that the system allows students to enrol for the qualifications one after the other, even when that clearly shows repetition of the same NQF Level

Findings also showed that obtaining a matric certificate was a priority to students just like obtaining trade certificate for students regardless of the fact that NATED and NCV could make it possible for students to obtain the equivalent of grade 12 certificate, OQ did not provide that opportunity on its own. The findings also showed that it is difficult to find a job as an apprentice using the NATED and NCV qualifications.

5.16 Conclusion

Literature on the vocational education and training suggests that there are significant weaknesses and strengths in the three different qualifications. The campus managers, lecturers of the three

qualifications and students who enrolled at TVET colleges in the engineering field of studies, all helped in the study. In conclusion, the three qualifications differ significantly in the approach and delivery method. Although they all lead to apprenticeship which ends with candidates taking a trade test to qualify as an artisan, their different approaches signify weaknesses and strengths.

5 lecturers strongly agree that students work together as a team in different projects. Only one lecturer said they cannot confirm teamwork among students.

The confirmation of teamwork by a majority of lecturers means that there is reasonable interaction among OQ and NCV students in similar practical projects that are conducted at the college. It must be noted however that NATED learners do not participate in such interactions because NATED students do not perform practical work when they are still at the college and therefore, are not obliged to go outside their syllabus stipulations in order to be seen as team players. It is sufficient for them to simply establish strong teams within the NATED disciplines that share the same vision. For instance, NATED learners of one campus can interact with those of the other campus of their college.

Connecting the findings and the theoretical/conceptual framework

This study revealed that there is a strong connection between literature and the findings. As Clarke & Winch (2005) indicated that applied theoretical knowledge requires workers to attain a body of theoretical knowledge which is considerably embedded in practical skills". This is collaborated by lecturers who teach Occupational Qualification that the theory knowledge is embedded in the practical skills, which, is the strength of Occupational Qualifications. (Clarke & Winch, 2005) further explained that it does not need a particular method of gaining that theoretical knowledge. One option would be to acquire theory before putting it into practice. The other would be the creation of theoretical knowledge from practice (Clarke & Winch, 2004). Accordingly, the finding was confirmed by lecturers that theoretical knowledge for the Nated qualification is acquired in colleges while practical knowledge is acquired in workplaces. Therefore, there is a close relationship between the findings and the theoretical / conceptual framework.

Barnett (2006) explains that there is a relationship between theoretical knowledge and academic pedagogy. He made a point that, there is a need to acknowledge the operational challenges of workplace activities before making links between disciplinary knowledge and vocational

pedagogy. Equally, disciplinary knowledge and situated knowledge do not automatically relate to each other. On one hand, situated knowledge is often stuck within its setting of application, whereas on the other hand disciplinary knowledge seeks to some measure of general applicability (Barnett, 2006). Another point to consider is that situated knowledge is often tacit and challenging to put into words, sometimes even tactile to do a job correctly, and therefore it is hard to codify. These matches well with the finding that NCV qualification and Occupational Qualification put more emphasis on the practical component and little on the theoretical component.

Furthermore, Barnett (2006) suggests that, if the emphasis is more on vocational pedagogy, then the framing of vocational knowledge for the purposes of teaching and learning must be seriously considered. This also collaborate with the finding that industry must be involved when developing or revising the NCV qualifications. This is also connecting findings with and the theoretical / conceptual framework.

CHAPTER SIX: CONCLUSIONS AND ANALYSIS

6.1. Introduction

This was a study into the perceived strengths and weaknesses of the National Technical Education (NATED), National Certificate Vocational (NCV) and Occupational Qualifications (dual system) on training plumbers in the South African Technical and Vocational Education and Training (TVET) colleges in the field of engineering studies. I used plumbing qualifications offered at National Qualification Framework (NQF) level 3 as a case study. The study investigated the role played by the lecturers, the campus managers and the students in the provision of the three qualifications. In the process, the study examined the policies of the Department of Higher Education and Training (DHET), the Department of Basic Education (DBE) and the Quality Council for Trades and Occupation (QCTO).

As articulated in the problem statement, students who want to study plumbing as a trade must choose between the three qualifications. Some students change the qualification pathways from one to the other after a certain period. The research therefore sought to understand, 'what are the perceived strengths and weaknesses of the three main qualification pathways- NATED, NCV and Occupational Qualifications, dual system for plumbers?' From this main question, I developed sub-questions to help the study with more information.

6.2 The structure of curriculum in NCV Level 2-4, NATED NI-N3, and Occupational qualification

The fact that all three qualifications are designed to end with apprentices taking trade tests at the end on 3 years shows a significant similarity. Another substantial finding is that the content of the theory component is the same for the three qualifications. This includes the use of the South African National Standards that govern the plumbing industry.

The finding that the state is taking over the responsibility of industry by funding the training of apprentices is profound. This is because the students of OQ are funded by NSF which is part of the state. Considering that the state funded the same OQ students when they were doing either NATED or NCV before enrolling for OQ, this would constitute doubling dipping for the OQ students.

Another important finding is that NCV is funded more than NATED because of its requirement for the practical component. Although the head count of NATED is more than that of NCV and OQ, its funding is less.

The OQ requires the service of the Lead employer who place students in relevant industries. The Lead employer shoulder the administrative function that could have been performed by both TVET College and the Host employer *(company where students are employed).* The lead employer administers the payments of the apprentices' wages, purchases the Personal Protective Equipment (PPE) for apprentices, responsible for providing the hand tools of each apprentice, and responsible for issues of disciplinary processes and procedures for the apprentices.

However, the finding in this regard is that the lead employer struggles to find place students in workplaces to perform all practical aspect of the trade. As a result, some students spend time performing tasks that are not related to the trade.

The fact that the Department of Higher Education and Training supports the OQ through NSF and pays for the training of apprentices makes it easy for employers to employ apprentices. This lessens the burden of training apprentices for employers who could not have afforded the cost of training apprentices. It is anticipated that small companies most likely benefit from this method of training apprentices since the costs for training are the responsibility of the Department of Education and Training. It is, however, unclear why companies are reluctant to take on apprentices since they are subsidised by the government.

The fact that syllabi of the NATED qualification are old is concerning. Plumbing Trade Theory was revised in 1996. Although the syllabi of some few subjects were revised in 2020 and few others are in the process of revision and this research is of the view that it is worrying that it took this long to revise them. Plumbing Trade Theory is among those which were revised for the implementation in January 2021. However, industry still prefer NATED over the other two qualifications.

The fact that practical is not offered at college level makes the NATED qualification weaker. So, students are referred to terminology and pictures of tools and equipment that they have never seen before. Although technology like YouTube is used to demonstrate how equipment and tools are used in industry, students would have benefited by performing small and basic projects in the

college workshop. The finding that industry still likes to send students to colleges to enrol for NATED shows that the knowledge component of this qualification is rich, and industry can introduce the new technology into the existing one that was learnt at the college.

The finding that NCV does not enjoy the support of industry is worrying because the qualification was only introduced in 2007. This means that the graduates of NCV struggle to find jobs as apprentices in the South African industries. This is a serious weakness for the qualification, because no one want to be told that the qualification that one has just completed is not recognised by the industry. This is caused by the way NCV qualification was structured.

The NCV qualification is structured in such a manner that working people cannot enrol as part-time students. This finding makes the qualification unappealing to employed people who would like to complete their theory component. This is because students are expected to complete the whole year at the college to complete each NQF Level. The fact that companies are so used to releasing their employees to college for three months attending NATED qualification makes it difficult for them to consider releasing their employees for the whole year to do NCV qualification. This therefore can be regarded as a perceived weakness on the part of NCV.

6.3 The lecturers' views about the value to students of each of the qualifications.

This research exercise study found that only 3 of the sampled lecturers who teach the three qualifications have obtained National Diploma as their highest qualification and views this as a cause for concern because knowledge component is just as important as the practical component. The knowledge component of the NATED and NCV lecturers could weaken the qualification if they are not well qualified to teach these qualifications.

More findings reveal that 2 lecturers who teach the three qualifications have obtained N4 as their highest qualifications. Furthermore, 1 lecturer who teach these qualifications is a qualified artisan.

The finding that although OQ is a desired qualification by lecturers, they expressed concern that the OQ has more challenges than the other two. The concern is about the apprentices who are not getting exposure to all aspects of training plumbers. The lecturers are informed by their apprentices when they come to college for knowledge component.

These findings show that colleges and industry do not communicate on how learning for the OQ students should take place when students are at industry. This also exposes the shortcoming of the

lead employers as they could not ensure that apprentices receive adequate training when in industry. This finding weakens the OQ as it does not happen when apprentices spend all the time at industry and only released for a trimester to attend knowledge component at colleges under NATED qualification. When students come back from the college, they are put on the production line under the supervision of the dedicated mentors.

6.4 Students' views on the offering of the programmes in a single institution

When studying the college enrolment records, I observed that 45% of the students who enrolled at TVET colleges to train as plumbers are female students. To me this is an encouraging development. This indicates that the number of female students taking plumbing as a preferred trade is increasing and that soon the number of female and male artisans would be equal. This would be in line with the UNESCO's goal of increasing the number of women participating in engineering sector.

The other significant finding that the enrolment records revealed is that 55% of students who enrolled to train as plumbers are between the ages of 25 – 29 years old. Most students who participated in the study were born in South Africa and therefore hold the South African citizenship. It is encouraging to observe that young people are participating in the training to become artisans.

The fact that colleges use different media to advertise programmes and qualifications they offer is encouraging as they reach more potential students to come to the college. However, the lead employers like the Institute of Plumbing South Africa (IOPSA) are used to advertise training opportunities for students who want to train as plumbers only. This is understandable because IOPSA is the association for plumbing industry. This finding is important to acknowledge the different ways used by colleges to attract students to their campuses.

These findings show that students did not have all information regarding the qualifications for which they wanted to enrol. This finding shows that the system allows students to enrol for the qualifications one after the other, even when that clearly shows repetition of the same NQF Level.

These findings show that obtaining matric certificate is just as important as obtaining trade certificate for students. Although NATED and NCV could make it possible for students to obtain the equivalent of grade 12 certificate, OQ does not provide that opportunity on its own. The

findings also show that it is difficult to find a job as an apprentice using the NATED and NCV qualifications. The finding about the bad treatment of apprentices when in industry exposes the shortcomings of the system.

6.5 The campus managers' views on offering three plumbing streams at the same college.

This research concludes that the view of the two campus managers was that it is not a problem to offer three plumbing streams at the same college. The however seem to suggest that even though offered by the same college, the courses should be spread across campuses. The great challenge which campus managers could not solve was how to spread around the teaching manpower as very few lecturers can take some of these courses. It would be costly for a lecturer to be moving from one campus to another. Campus managers therefore ended up suggesting that the current set up should remain operational until enough capable manpower is at the disposal of colleges to spread it across campuses and thus ensure there is no situation whereby the three streams coexist in on campus.

6.6 The perceived strengths and weaknesses of the three main qualification

Pathways- NATED, NCV and occupational qualifications, dual system for plumbers

After a careful study of the literature related to the research topic and a thorough analysis of the feedback obtained from interviews with the participants as well as feedback from interpretation of returned questionnaires, this research has noted the following perceived strengths and weaknesses related to the three main qualifications.

The perceived strength of the NATED course is that it appeals to the prospective student because it is only a 3-year course where as NCV is a 4-year course. With the NATED course N1 can be completed in 3-months whereas in NCV one level can only be completed in a year. This research therefore observed that prospective students usually do not go for the NCV courses if they qualify to study the NATED ones. To most students the length of the NCV course is regarded as a weakness despite the fact that NCV has a practical component that puts learners who complete it at a better footing than the learners who did NATED when the graduates of the two courses get to workshops. The fact that the NATED program is flexible in that a working person can take study leave and enrol with a TVET college to study and return to work implies that it is worker friendly

and workers who did not have time to study learnership related courses can do so whilst they work. A worker can enrol as a part time student from N1 to N3.

Such provisions are not available in NCV where one has to finish the 4-year course in order to be recognised. Another perceived strength of NATED is that the NATED course allows workers with practical experience but no theoretical knowledge, a chance to enrol under the auspices of an Artisan Recognition of prior learning (ARPL) student provision. On the other hand, the OQ course's perceived strength is that one enrols for it when they are already employed as apprentices in an industry. It however has a perceived weakness in that all students who are not employed cannot enrol for the OQ programme. This exclusion of non-employed prospective students for OQ courses is not appreciated by most participants who feel it has to open up for even those who have simply completed NATED or NCV but are not attached to any firm as apprentices.

6.7 Conclusion

The main argument of this research is that there are significant differences in the manner in which practical and theoretical knowledge are taught which lead to the perceived weaknesses and strengths of the three qualifications. This viewpoint came about as a result of the literature review on the vocational education and training. The campus managers, lecturers of the three qualifications and students who enrolled at TVET colleges in the engineering field of studies all helped in the study.

They all indicated that the main differences are the manner in which practical and theoretical knowledge are taught in the three courses, which appears to be a strong factor in the perception of the strengths and weaknesses of NCV and OQ over the NATED qualifications. Therefore, the main weakness of the NATED qualification is the absence of the practical component at the college level. The other main weakness of NATED is its old syllabus which requires updating. However, the main strength of the NATED is its flexibility to allow working students to attend classes on a block release basis or as part time students. NATED also allows students who are not employed to continue with their studies until they find the opportunity to become apprentices. The trimester system makes NATED a quick qualification to complete within short period of time.

The main weaknesses of NCV is that it does not allow employed students to attend classes on full time or part time bases. The qualification requires students to complete the whole three years to

exit the programme. Student who fails one subject is required to attend the whole year to write that subject before receiving the certificate. The other weakness is that some lecturers found it difficult to teach both practical and theory at the same time. However, the strength of the qualification is the basic practical component which provides students with the skills to start own businesses. Graduates of plumbing are able to start small business of fixing the water leaks, geysers and other related work.

The strength of Occupational Qualification is that its students are already employed by their different companies as apprentices. These students earn stipends at the same time. However, the weakness of the qualification is that DHET appointed the lead employer to be the fund holder that pays the expenses of training apprentices. The lead employer is also expected to find the host employer to place students to train as apprentices. The problem is that the lead employer for plumbing students is the Institute of Plumbing South Africa (IOPSA) which only conducts their associate companies to be the host employers. The other weakness is that when the host employer is not able to conduct all practical component, the lead employer is not able to find the alternative host employer to conduct the missing practical component. When this happen, colleges have no choice but to teach the missing practical component, which is not exactly the same as the workplace situation.

The literature review exposed some inconsistencies over management of these qualifications. To mention just few, the infrastructure of TVET Colleges received a large boost after the infrastructure recapitalization funding announced by the Minister of Education in the 2005 budget speech (NDP, 2015). As Wedekind (2014) explained that, the recapitalization fund was responding to the condemnation that the colleges lack infrastructure and equipment to play the important role in training skilled labour. The workshops that were built in colleges were intended to teach NCV qualification. The change was not well managed as lecturers were not adequately prepared to teach the practical component of the NCV qualification.

As Cosser et al., (2011) explain, the NCV was introduced in 2007 with just fourteen programmatic fields. The enrolment of NCV was not large enough to compensate for the drop in the Nated enrolments. In 2009 the throughput of students who started the programme in 2007 was only 4, 4%. According to Cosser et al., (2011) the poor throughput rate is the reason for low enrolment for the NCV qualification. The poor throughput results mean learners stay in the programme

leading to the qualification for an extended period. The poor management of the transitions from NATED to NCV resulted in both qualifications being offered at the same time.

According to Allais (2012), the Department of Education was responsible for technical and vocational education delivered through the further education and training colleges, whilst the Department of Labour was responsible for workplace skills programmes, delivered through the SETAs. In 2009, the government created the Department of Higher Education and Training (DHET) under which all skills-related functions associated with the National Skill Development Strategy (NSDS) and SETAs fell (Wedekind, 2014). Furthermore, National Development Plan 2030 reports that, in spite of the enormous amount of levy-funded institutions, SETAs have not made a significant improvement to solve the skills development problem (National Planning Commission, 2012). Therefore, the establishment of SETAs did not improve the skills shortages as companies are not employing adequate number apprentices. Even when DHET through NSF continues to fund the training of apprentices using the Occupational Qualifications lesser students are trained as apprentices. This exposes the inconsistencies of managing the three qualifications.

In conclusion, the three qualifications differ significantly in the approach and delivery method. Although they all lead to apprenticeship which ends with candidates taking a trade test to qualify as artisans, their different approaches signify weaknesses and strengths.

It is a complete waste of money for students to complete N1 – N3 or NCV before enrolling for the Occupational Qualification. NCV and NATED students should further their studies by enrolling for N4 – N6 on NQF level 5.

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8. APPENDICES

Appendix 1: Letter to College Principals

Ms XX

Principal:

YY TVET College

Private Bag XXXXX

XXXXXXX

XXXX

Dear Madam,

Re: Permission to conduct research at XX TVET College

My name is *James Mogale*, I am a student in the School of Education at the University of the Witwatersrand. I am studying for a Master's degree in the Centre for Researching Education and Work at the University of the Witwatersrand. I am seeking permission to do research at XX TVET College.

I am conducting research on - *The perceived strengths and weakness of NATED, NCV and Occupational Qualifications (dual system) in training plumbers at TVET Colleges.* The research proposes to study perceptions of managers and lecturers involved in training plumbers in two South African Technical and Vocational Education and Training (TVET) colleges in engineering field of studies. Students will also be interviewed regarding their perceptions on these three qualification pathways. The study intends to use the example of plumbing qualifications offered at National Qualification Framework (NQF) level 3.

I will look into the perceptions and experiences of lecturers and students regarding the provision of the three qualifications. In the process of the study, I will examine the policies of the Department of Higher Education and Training (DHET), the Department of Basic Education (DBE) and the

Quality Council for Trade and Occupation (QCTO) mainly on the provision of curriculum for vocational education and training.

I will invite the campus manager, 3 lecturers and 6 students from your college to participate in this study. If they agree, they will be asked to complete a survey form and answer few questions of the questionnaires in different focus group discussions. Each focus group will require 1 and half hours set aside during their free period at the college. The participant's responses will be audio recorded.

Participants will be asked to give their written or verbal consent before the research begins. Their responses will be treated confidentially, and identities (their names and the name of the college) will be anonymous unless otherwise expressly indicated. Individual privacy will be maintained in all published and written data resulting from the study. The results will be communicated as dissertation.

The research participants will not be advantaged or disadvantaged in any way. They will be reassured that they can withdraw their permission at any time during this project without any penalty. There are no foreseeable risks in participating in this study. The participants will not be paid for this study. All research data will be will be preserved anonymously for reuse by other researchers.

I therefore request permission in writing to conduct my research at your college. The permission letter should be on your college's headed paper, signed and dated, and specifically referring to myself by name and the title of my study.

Please let me know if you require any further information. I look forward to your response as soon as is convenient.

Yours sincerely,

James Mogale

084 510 2430

1756658@students.wits.ac.za

Professor Yael Shalem

083 232 9066

Yael.Shalem@wits.ac.za

Appendix 2: Participant's Consent Sheet

Project Tittle: The perceived strengths and weaknesses of NATED, NCV and Occupational Qualifications (OQ) in training plumbers at TVET Colleges

I have been given a participant information Sheet which explains the nature and processes involved in this study, which is attached hereto;

I was given time to read it, or had it read to me, in the language I best understand;

I was given time to ask any question I wanted to and found any answers given to me to be reasonable and satisfactory;

I believe I fully understand why the study is being conducted and what the intended outcomes will be;

I understand that there will be no immediate benefit to me, should I agree to participate, nor will I receive any payment; conversely, participation will not cost me anything but my time;

I understand that, even if I initially consent to take part in the study, I may subsequently withdraw at any time and would not be required to give any reasons; if that happened, any data collected about the purpose of the study would immediately be destroyed, unless I give consent for it to be retained; and

I have been given a range of contact details, listed below. If I require further information or become concerned about any aspect of this study I am free to speak to any of these contacts.

Contact details:

James Mogale. Principal Investigator, telephone no. 084 510 2430, or by email at 1756658@dstudents.wits.ac.za

Professor Yael Shalem, Supervisor, on telephone no. 083 232 9066, or by e-mail at Yael.Shalem@wits,ac.za

Professor CB Penny, Chairperson of the Human Research Ethics Committee (Medical) at the University of Witwatersrand, on telephone no. 011 717 2301, or by e-mail at Clement.Penny@wits.ac.za

Ms Z Ndlovu or Mr Rhulani Mkansi, Committee Secretariat, telephone nos: 011 717 2700 or 1234, or by e-mail at: Zanele.Ndlovu@wits.ac.az or Rhulani.Mkansi@wits.ac.za

The text in the Consent Sheets below is intended to be neither exhaustive, nor applicable in every circumstance. Researchers are free to customize them according to the particulars of their study.

Name of Participant: ----------

Date: ----------

Place: ----------

Signature or mark: ----------

Witnessed by:

Name of Witness: ----------

Signature: ----------

Date: ----------

Appendix 3: Consent Form for Audio Recording of Study Participation

Project Tittle: The perceived strengths and weaknesses of NATED, NCV and Occupational Qualifications (OQ) in training plumbers at TVET Colleges

I hereby consent to audio recording of the interview and focus group discussion.

I understand that:

The recording will be stored in a secure location (a locked cupboard or password protected computer) with restricted access to the researcher and the research supervisor.

The recording will be transcribed and any information that could identify me will be removed,

The recordings will be erased within either (a) two (2) years of the publication of the research findings, or (b) six (6) years, if no publications arise from this research

Anyone wishing to access this information in the future will first have to obtain the approval of the Human Research Ethics Committee of the University of Witwatersrand, Johannesburg.

Direct quotes from my interview, without any information that could identify me, may be cited in the research report or other write-ups of research.

Name of Participant: ----------

Date: ----------

Place: ----------

Signature or mark: ----------

Witnessed by:

Name of Witness: ----------

Signature: ----------

Date: ----------

Appendix 4: Letter of Approval to Conduct the Study

Letter head of the college

Mr James Mogale
103 Frangipani Street
WINCHESTER HILLS
2091

Dear Mr Mogale

REQUEST FOR PERMISSION TO CONDUCT RESEARCH IN EKURHULENI EAST TVET COLLEGE: THE PERCEIVED STRENGTHS AND WEAKNESS OF THE NATIONAL TECHNICAL EDUCATION (NATED), NATIONAL CERTIFICATE VOCATIONAL (NCV) AND OCCUPATIONAL QUALIFICATION (OQ), DUAL SYSTEM IN TRAINING PLUMBERS AT TVET COLLEGES

I acknowledge receipt of your request for permission to conduct research in Ekurhuleni East TVET College on the topic: "*The perceived strengths and weakness of the NATED, NCV and Occupational Qualification, dual system in training plumbers at TVET Colleges"*

It is my pleasure to inform you that your request for permission to undertake the above research has been granted. It is noted that you will collect data by having one-on-one interviews with the campus manager, three lectures and a focus group of students.

The topic of your research is of great interest to the college. Therefore, it would be highly appreciated if you could share the finding of your research with the college upon completion of your research.

I wish you all the best in your research study.

Yours sincerely

Ms XX

Principal: YYY TVET College **Date:**

Appendix 5: Lecturers Survey

a. Name of Institution				
b. Location of Institution				
1. Name of Respondent				
2. Qualification teaching (NATED/NCV/ Occupational Qualification)				
2. What are your highest qualifications with respect to the subjects you teach? **3.** 1. How long did you teach the NATED/NCV/OQ (Years of Experience)				
4. What level do you teach for this qualification?				
5. How many students per group?				
6. How frequently do the following activities take place in your group?	None	A little	Sometimes	A lot
a. I teach for the entire class				
b. Students work independently at their own pace				
c. Students work in groups				
d. Students give presentations to the whole class				
e. Students engage in problem solving / project-based learning activities, either in writing or in conversation with other students				

f. Students provide feedback to lecturers on their learning activities				
g. Students perform practical work in the workshop				

7. Do you have the following ICT equipment in class?	Yes	No	Own/College
a. Desktop/laptop			
b. Kindle/Tablet			
c. internet connectivity			
d. Interactive Whiteboard			
e. Data Projector			

Opinions/Attitudes about TVET

8. To what extent do you agree or disagree with the following statements about the NATED, NCV and OQ?	Strongly Disagree	Disagree	Agree	Strongly Agree	Don't Know/No Opinion
a. The syllabus covers all aspects of the plumbing trade					
b. There is no academic support for struggling students					

c. The college provides feedback to students regarding the learning assessment					
d. Students work together as a team in different projects					

Interview Questions Guide for lecturers who teach NATED/ NCV/ OQ

What I am trying to find out is the perception of lecturers on the offering of the three qualifications at the same institution.

Main Research Question:

What are the perceived weakness and strengths of the three main qualification pathways- NATED, NCV and occupational qualifications, dual system?

Interview Questions

Name of the organization:

Code (for confidentiality) of the interviewee:

Geographical location:

1. Does your college offer any of the following qualifications?

NATED	NCV	Occupational qualification (dual system) in the plumbing field of engineering studies	All of the above

2. How does the structure of the 3 qualifications differ?
3. (As a lecturer) what challenges do you experience in teaching NATED / NCV / OQ?4. How have you been able to overcome these challenges? Please explain.
4. What kinds of support do you get from the campus manager in executing your duties as the teacher of the NATED/NCV/OQ?
5. What do you think are the strengths and weakness of the NATED/NCV/OQ?
6. What do you think are the reasons for students' choice between NATED/NCV/OQ?
7. What would you change in the manner in which the NATED qualification is offered?
8. Does the fact that the NATED qualification does not require the practical component at the college bother you?
9. How is the curriculum for plumbing structured in each of the three qualifications?
10. Are there any topics which you know are not included in one of those qualifications which you think should be there?

Appendix 6: Student Survey

1. Name					
2. Gender	Male	Female			
3. Race	African	Coloured	Indian	White	Other
4. Age/Year of Birth					
5. Were you born in South Africa	In South Africa	In African Continent	Other Continent		
6. Where do you live?	Farm	Village	Township	Suburban	Other
7. What is your mother tongue?					
8. What is the highest level of education completed?					
9. What qualification are you enrolled in?	NATED	NCV	Occupational qualification (dual system)		
10. Do you have all textbooks?					
11. Do you have all Drawing Instruments and calculator?					
12. Do you have all Personal Protective Equipment (PPE)					

13. Have you used a computer (desktop or laptop) before you came to the college?	Yes	No
14. Do you now have access to the computer lab?	Yes	No
15. Do you have laptop		
16. Do you have access to internet		

Experiences during the training

17. Did you experience discrimination in …	Not at all	A little	Somewhat	A lot	Not Applicable
a. classroom					
b. college workshop					
c. workplace					
18. Did you experience discrimination in …	Not at all	A little	Somewhat	A lot	Not Applicable
a. classroom **b.** college workshop **c.** workplace					
Interest in the qualification					

19. What motivated you to enroll for the qualification	Most likely	Likely	Not sure	Unlikely	Most Unlikely
a. Did not have money to go to university					
b. Did not have any other choice as all other courses were full.					
c. My parents pushed me.					
d. My friends pushed me.					
e. passion of being a trades man					
f. State funding for the course.					

Interview Questions Guide for NATED/NCV/OQ students

What I am trying to find out is the perception of students on the offering of the three qualifications at the same institution.

Main Research Question:

What are the perceived weakness and strengths of the three main qualification pathways- NATED, NCV and occupational qualifications, dual system?

Interview Questions
Name of the organization:
Code (for confidentiality) of the interviewee:
Geographical location:

1. Your college offers the NATED, NCV and Occupational qualification (dual system) in the plumbing field of engineering studies. Which qualification did you enroll for?
2. What level are you in at the moment?

3. How did you get to know about the NATED/NCV/OQ qualification?
4. What are the main similarities between the three qualifications?
5. What are the main differences between the qualifications?
6. Why did you choose this qualification (i.e. NATED/NCV/OQ)?
7. Did the cost of the NATED/NCV/OQ qualification influence your choice?
8. Would you choose the same qualification again if you knew what you know now?
9. Would you recommend the NATED/NCV/OQ qualification to anyone?
10. Which qualification do you think prepares students very well and why?
11. What would you list as the weakness or strengths of the NATED/NCV/OQ qualification?

APPENDIX 7: Interview Questions Guide TVET College Campus Manager

What I am trying to find out is the views of the campus manager on offering three plumbing streams at the same college?

Main Research Question:

What are the perceived weakness and strengths of the three main qualification pathways- NATED, NCV and occupational qualifications, dual system?

Interview Questions

Name of the organization:

Code (for confidentiality) of the interviewee:

Geographical location:

1. Your college offers the NATED, NCV and Occupational qualification (dual system) in the plumbing field of engineering studies. How long have you offered the 3 qualifications?
2. What are the main similarities between the three qualifications?
3. What are the main differences between the qualifications?
4. The NATED students do not require practical component from the college as this is done at workplaces, but NCV and Occupational qualifications require practical component to be provided by the college. How do you provide practical component to the 2 qualifications?
5. What other differences exist between the 3 qualifications?
6. The NATED and NCV qualifications receive the Departmental grant whilst the Occupational qualification receive NSF funds for operational costs. How do you spread the funding of the 3 qualifications equitably?
7. How do you allocate the workload of the lecturing staff to the 3 qualifications equitably?
8. Resources required to offer the 3 qualifications varies considerably mainly due to the practical and theoretical requirements. How do you allocate resources to the 3 qualifications?
9. What would you list as the weakness and strengths of the 3 qualification?
10. If you had powers, what would you change in terms of the manner in which the 3 qualifications are offered?