EXPLORING THEORY AND PRACTICE IN THE NATIONAL CERTIFICATE VOCATIONAL (NCV) IN AN AUTOMOTIVE REPAIR AND MAINTENANCE (ARM) COURSE

By

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ABSTRACT

There is an undeniable increase in the research being conducted surrounding the TVET colleges. There is however, a small amount of research conducted in South Africa particularly regarding the relationship between theory and practice in the curriculum. The purpose of this research is to explore the relationship between theory and practice in the National Certificate (Vocational) Automotive Repair and Maintenance (NCV ARM) course.

The key research questions are as follows: 1. What is the emphasis on propositional knowledge and practical knowledge in the official curriculum documents? (i.e. The Subject and Assessment Guidelines of the Automotive Repair and Maintenance curriculum) 2. What is the emphasis on propositional knowledge and practical knowledge in the teaching of the NCV Automotive Repair and Maintenance module? (i.e. The enacted curriculum) and 3. How do NCV (Automotive Repair and Maintenance) students at Campus X experience the curriculum? (i.e. The experienced curriculum).

The literature exploration conducted here was informed by theoretical concepts engaged with by Winch (2012), Rauner (2007), Gamble (2009a) and Glatthorn (1987). Rauner (2007) states that theoretical knowledge and practical knowledge work together, and in order to carry out the practical knowledge the underpinning theoretical knowledge must be known.

In order to respond to the three research questions mentioned above various data collection methods were used. In order to address RQ One an analysis was conducted of the NCV ARM Level two official curriculum document. RQ Two was explored by conducting observation during classroom activities and an interview with the NCV ARM lecturer. RQ Three was investigated by means of focus groups conducted with NCV ARM Level two students (five of which were high achievers and five were average achievers).

The research is a case study and an interpretivist view was adopted. Regarding the official curriculum, more of the learning outcomes focused on propositional knowledge. The classroom observation and interviews revealed that both lecturer and students identified lack of resources and time as learning barriers to students developing practical competences. The NCV was introduced with the intention of the program being more practically based, however

upon investigation it was noted that the theory continued to dominate the curriculum. This is not something that was expected from the new revised curriculum.

DECLARATION

I, Sanusha Chetty declare that:

The research reported in this dissertation, except where otherwise indicated and is my original work.

This dissertation has not been submitted for any degree or examination at any other university.

This dissertation does not contain other persons' data, pictures, graphs or other information, unless specifically acknowledged as being sourced from other persons.

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Signed:

Date: 16 March 2017

DEDICATION

To:

This dissertation is dedicated to my late father, Mr. Pregalathan Naidoo, who I wish I could have had more time with. Your presence is felt regardless.

Now that I am older, I have a better idea of everything you did for me when I was growing up. You worked so hard to make sure I was happy and healthy and had everything I needed…I don't think I'll ever be able to thank you enough for all you've done for me. But today and always know that I am eternally grateful!!

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ABBREVIATIONS

ANC	African National Congress
ARM	Automotive Repair and Maintenance
AS	Assessment Standards
DHET	Department of Higher Education and Training
DoE	Department of Education
ESASS	External Summative Assessment
ETQA	Education and Training Quality Assurance
ICASS	Internal Continuous Assessment
ISAT	Internal Summative Assessment
LO	Learning Outcomes
NATED	National Education
NDP	National Development Plan
NCV	National Certificate Vocational
PSET	Post-School Education and Training
RQ	Research Question
SAG	Subject and Assessment Guidelines
SO	Subject Outcomes
TQMS	Total Quality Management Systems

TVET	Technical Vocational Education and Training
VET	Vocational Education and Training

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CHAPTER ONE

INTRODUCTION TO THE STUDY

1.1 INTRODUCTION

In this chapter I position the research in its theoretical and empirical fields and describe the rationale for this study. In order to position the research empirically, this chapter depicts the progression of curriculum change that has taken place in South Africa since 1994, soon after the new democratically elected government took leadership. The development of the local curriculum reform is located within the literature on education transformation and policy studies. Firstly, I will start with a discussion regarding the history of TVET in South Africa, followed by the government's stance, regarding TVET, a discussion on the curriculum reform and this will then follow up with policies that affect the TVET College.

Empirically, the study is located within a specific case of the National Certificate (Vocational) (NCV) in the Automotive Repair and Maintenance (ARM) Level two at a Technical and Vocational Education and Training (TVET) College. Theoretically, the study is broadly located within the field of the sociology of knowledge and more specifically within the theories of Rauner (2007), Winch (2010), Gamble (2009a) and Porter (2004). The theoretical issues are described in more detail in Chapter Two. This chapter concludes by outlining the structure of the thesis.

1.2 FOCUS AND PURPOSE OF THIS RESEARCH

The focus of this research is to explore the relationship that may or may not exist between propositional knowledge and practical knowledge in the official and enacted curriculum. This research situates itself within the context of Technical and Vocational Education and Training (TVET Sector Review), specifically in the NCV ARM Level two at Campus X.

The research here focuses specifically on three conceptual levels of curriculum. Firstly, an analysis of the official curriculum in terms of the NCV ARM Level two SAG (Subject and

Assessment Guidelines) was conducted in order to analyze the relationship between propositional and practical knowledge in the curriculum. An interview with the NCV ARM lecturer and classroom observation was also conducted. Secondly, the enacted curriculum, these are activities that were carried out in the classroom which focused on the lecturer and the pedagogy that was employed. Thirdly, the experienced curriculum looked at the viewpoints or experiences of the students in the NCV ARM Level two classroom / workshop; this was investigated by means of focus groups consisting of ten participants each.

The purpose of this study is to describe the proportion of propositional knowledge and practical knowledge in the ARM program of a particular TVET College in the Pietermaritzburg area. This study is situated particularly in the NCV ARM Level two. It aims to trace the relationship between propositional knowledge and practical knowledge within the official, enacted and experienced curriculum in a program offered at one particular campus.

1.3 RESEARCH QUESTIONS

This study aims to answer the following questions:

1. What is the emphasis on propositional knowledge and practical knowledge in the official curriculum documents? (i.e. The Subject and Assessment Guidelines of the Automotive Repair and Maintenance curriculum).
2. What is the emphasis on propositional knowledge and practical knowledge in the teaching of the NCV Automotive Repair and Maintenance module? (i.e. The enacted curriculum) and
3. How do NCV (Automotive Repair and Maintenance) students at Campus X experience the curriculum? (i.e. The experienced curriculum).

1.4 HISTORY OF TECHNICAL COLLEGES IN SOUTH AFRICA

1.4.1 HISTORY OF TECHNICAL COLLEGES

The history of technical and vocational education in South Africa is bound to the early development of the South African economy and to the discovery of diamonds and gold in the 19th century. With the discovery of gold and diamonds came great developments of railways, power supplies, urban areas and commercial farming and manufacturing. Due to the expansion and growth of the railway industry the demand grew further for the railway technicians to have relevant skills. The same applied for the rapidly growing mining industry that needed engineers (Department of Education, 2007b).

The Natal Government Railways started the first technical education classes for railway apprentices in Durban in 1884. Classes began spreading like wild fire throughout the country. In 1896 the School of Mines was developed in Kimberly were De Beers Mining made evening classes compulsory for their employees (Malherbe, 1977).

In the early 1900s technical education grew rapidly. A conference was held by the Education Advisor to the High Commissioner for the Transvaal and Orange River Colony in 1902 and one of the main resolutions that were passed was that in conjunction to technical schools, higher education should also be instituted. Between 1906 and 1916 a flood of technical colleges were established (Department of Higher Education and Training, 2013b).

In 1956, the Department of Education (DoE), in consultation with affected industries and relevant stakeholders, began developing courses for engineering technicians, namely; chemical, electrical and mechanical. The first technical courses were introduced in 1958 (Malherbe, 1977).

Toward the latter part of the 1960s, South Africa had experienced yet another flourishing economy, with this came a skills shortage. Taking into account the apartheid laws, people of colour were restricted and suppressed regarding the education they received. Between 1946 and 1970 the registration of Black students, in the local colleges, rose throughout the country. The restricted access that Black students had to the chiefly White Cape Technical Colleges was terminated in 1962. On one hand, during 1967, there were but five colored students that

attended the Cape Technical Colleges, which housed 2100 students at the time. On the other hand, the Indian students were attending the ML Sultan Technical College, which was later absorbed into higher education under the 1923 Higher Education Act (Department of Education, 2007b).

Due to the impact of the 1976 Soweto uprising there were significant changes in the education system. The Bantu Special Education Act of 1964 was replaced with The Education and Training Act of 1979 (Gamble, 2009b). According to the TVET Sector Review (1992) by 1990 the 123 technical colleges that were formed consisted of 67 White, 3 Indian, 8 Colored and 45 Black institutions.

The above described the evolution of the technical colleges during the apartheid era. The next section will discuss the reform of the technical colleges into the FET sector.

1.4.2 TECHNICAL COLLEGE REFORM POST-APARTHEID

An assurance to the right of access to education has been a part of South Africa's education system only since 1994, with the switch to democracy. This commitment has been enshrined in the Constitution of South Africa (The Republic of South Africa, 1996), which states that:

Everyone has the right: (1) to basic education, including adult basic education; and (2) to further education, which the state, through reasonable measures, must make progressively available and accessible.

Prior to 1994 the South African education system was characterised by inequality of provision, resourcing, access and quality. Since the democratic elections, redressing the legacy of fiscal inequalities, infrastructure backlogs and unequal outcomes in education has been the priority for the government. The reorganization of the FET commenced rapidly in 1995 (TVET Sector Review, 1992).

Schooling in South Africa is compulsory up to Grade 9. Further education and training is not compulsory for a student to complete, but the government is constitutionally obliged to make it gradually available and accessible to the community at large. This is done either in the senior secondary component of schooling or in further education and training (FET) colleges,

which provide skills training to post-compulsory school leavers and adults (Department of Education, 2007a). The apparatus for transforming the FET college sector was laid out in the Further Education and Training Act of 1998 and the Department of Education's New Institutional Landscape Document which put forward proposals for 50 new FET colleges and for cultivating the quality and responsiveness of this sector (Akoojee, McGrath, & Visser, 2008).

1.5 CURRICULUM REFORM IN THE TVET COLLEGES

Several countries across the world are continuously faced with the challenge of upgrading the competence of the labour force in order to react to their national development requirements and to the demands of a swiftly changing, more internationally competitive globe. In South Africa, the TVET colleges are considered as a foundational component of the national development strategy. There are numerous dynamics in the operating surroundings that have produced these circumstances (Mgijima & Morobe, 2013).

As explained above, the occurrences over the past few years have allowed the Government to come to value the TVET colleges. The college programs that are being delivered at the many sites are crucial for the enhancement of the skills base of the nation. The vocational programs are anticipated to unswervingly react to the priority skills demand of the contemporary market. There is a superior necessity for programs that are pertinent to South Africa's economic growth path. One of the greatest crimes committed by that of apartheid was the stipulation of inferior education to the majority of the nation. Admission to an education system was restricted and quality was meagre (Mgijima & Morobe, 2013).

A statement was made by former Deputy President, Kgalema Motlanthe while delivering a speech at the University of Witwatersrand:

> Economic productivity is the fruit of long-term investment in the national education system. Short of an education system geared to the particular developmental needs of the country, we will be hard put breaking into high-level economic productivity that can extricate us from the inter-generational cycle of poverty (BuaNews, 2013).
>
> The faith that is being placed in human capital as a means to addressing this country's economic and social challenge is widespread, however not only restricted to government

> but also to society as a whole. The TVETs have been boldly mentioned as a solution (Wedekind, 2014).

Financial hypothesis commonly highlights the function of vocational education as a feature of economic growth. It is frequently disputed that there is a secure relationship between economic growth on the one hand and the TVET system on the other, given its key purpose of providing the essential labour force for the labour market. In this regard, TVET college programs necessitate incessant adaptation to act in response to the varying requirements in the labour market. To comprehend this, Government has invested profoundly on reforming the vocational education system. Even though much has been accomplished, there are still an abundance of challenges that may have to be attended to predominantly in the area of skills development (Mgijima & Morobe, 2013).

Although, the further education and training structure should be seen as a 'responsive' system in both South Africa and internationally, the reality is that this system tends to shadow school like behaviour, outdated and is disjointed from the world of work. Taking into consideration the swift change in society as well as technology, the TVET colleges needed to adapt and be flexible to the wants and needs of employers. TVET collegess must develop strong partnerships with industry and connect both the student and the lecturer to the workplace (Wedekind, 2014).

1.6 WHAT IS THE STANCE OF THE GOVERNMENT REGARDING THE TVET?

When the Green Paper was introduced in 1998 it brought about the reorganisation and reorientation of the FET band. The Green Paper highlighted many negative qualities of the existing system:

> Lack of coherence, the lack of articulation, poorly co-ordinated funding mechanisms, poor linkages to industry, a distorted labour market and a system that was marked by low morale, poor work ethic and low professional self-esteem amongst educators (Wedekind, 2014, p. 64) .

During 2006 – 2009 a recapitalisation process took place, due to the point that colleges were critiques for not having the proper resources and infrastructure in order to carry out activities to their optimum. However, during this process the finances were not used on specific material but rather generic and this did not assist the colleges in any way.

In 2006, the FET Colleges Act (No. 16 of 2006) was passed and this brought about a clear separation of the TVET colleges and the schools. Lecturers were now employed by the Council and not the Department of Education. This was done in order to make the colleges more responsive; however consequences were far graver. Long standing staff were unwilling to move their pension over to the council and this resulted in them being redeployed to the DoE and /or schools. Colleges did not allocate staff properly according to the numbers enrolled this brought about an increased need for the colleges to become dependent on the contract staff.

Dr. Nzimande (2014), minister of Higher Educaton and Training, states that South Africa still has a Post-School Education and Training System (PSET) which does not offer adequate place for countless youth and adults seeking education and training. Development is required, in terms of statistics regarding available places, and in the types of education and training available. He argues that the expansion of integrated, fully articulated and flawless PSET has become a simpler process with the establishment of the DHET in 2009.

1.7 CURRICULUM REFORM IN THE TVET SECTOR

There were two main institutional components of the FET band on the NQF; they comprised levels two to four and the technical colleges. In order to align these two components *The Green Paper on Further Education and Training: Preparing for the twenty-first century through education, training and work* was released in 1998. This Green Paper was aligned with concepts of lifelong learning, increased productivity and employability (Wedekind, 2014).

NATED is the acronym for National Education, otherwise referred to as the N-courses and is the curriculum for vocational subjects that existed before the NCV. The N-courses were linked to the apprenticeship system and were offered on a trimester or semester basis.

Although the courses were outdated they were still popular with industry due to the familiarity that industry had with these courses.

The NATED programs lost much of their significance to the modern working world, due to their extensive theoretical foundation. However, this created a barrier to the number of graduating students since NCV is a three year program. With the demand for NATED from both employers and learners, the Higher Education and Training Minister was obligated to withdraw from phasing out of the NATED programs. In the process a curriculum review of the college programs for NATED is to take place (Akoobhai, Gewer, & Shindler, 2011).

Students who had passed grade 12 were eligible to register for N4, under the business studies or engineering division, which assists them when they articulate to higher education if the high school results were below average or if they were not accepted at a university or technikon.

1.8 NATIONAL CERTIFICATE (TVET SECTOR REVIEW)

1.8.1 WHAT IS THE NCV?

According to Wedekind (2006) the NCV curriculum was circulated after a comparatively short development phase in 2006 and subsequently made operational in January 2007. The NCV was implemented to address issues of scarce or skills of high demand. The main aim of the NCV qualification is to equip students with the necessary knowledge, practical skills and understanding to apply what they have learnt in the workplace.

There was a shift in South African technical education from the N-courses which were job specific, toward the NCV which was a combination of generic skills and job specific orientation. The NCV spanned across seventeen fields of study over three years of full time enrolment. The curriculum was implemented to promote simulation and practical work experience in order to complete the NCV level four (Powell, 2013).

The NCV was implemented to unite theory and practice. Learners are in a distinctive position as they are taught a subject in the NCV that aimed to integrate boththeory and practice. This has a great advantage for the learner as it makes it easier for the learner to apply their

theoretical knowledge in the real world work situation. This integration is crucial because in many instances learners tend to work with these two components in isolation.

The implementation of the NCV in 2007 coincided with the projected phasing out of the NATED (N1 – N6) programs. Allais (2011) notes that the NCV was brought in to replace the apprenticeship system. The apprenticeship system worked where the lecturers would teach theory for a period of three months and then students would enter the work place for three months on a rotation basis. This eventually led to the student being trade tested and a qualified artisan.

The NCV Level two was put in place to enable the students to obtain the necessary knowledge, practical skills, applied competence and understanding necessary for employment at an elementary level of a specific occupation or trade. The NCV Level two will provide learning experiences in situations contextually pertinent to that particular vocation in which the programme is situated (Department of Education, 2006).

The NCV was introduced to replace the NATED courses (N1-N6) at TVET Colleges as a more practical alternative compared to that of the NATED; however NATED remained a firm favourite and the demand for NATED courses increased. NATED courses are still offered at the various campuses.

The NCV is meant to give students with a grade 9 qualification a vocational alternative to an academic grade 10 – 12 by offering industry – focused training on the NQF levels 2 - 4. These qualifications are designed to provide training at both the theoretical and practical levels. The practical component of the study may be offered in a real workplace environment or in a simulated workplace environment or in most cases a workshop for the specific trade being offered. The NCV was implemented to provide students with the opportunity to familiarize themselves with work-like situations during their period of study.

1.8.2 ENTRANCE REQUIREMENTS TO THE NCV

The minimum requirements for the NCV Level two are:

1. Grade 9 certificate or
2. Adult education and training (ABET) NQF 1 certificate or
3. Recognized equivalent qualification obtained at NQF 1 or
4. Approved bridging programme designed for the specific purpose of access to NQF 2 or
5. Recognition of prior learning (RPL) assessment programme which meets the basic requirements for access to NQF 2 (Department of Education, 2006).

Each level of the NCV is a one-year instructional programme comprising 200 teaching and learning hours. The course may be offered on a part-time basis provided the student meets all the assessment requirements. Students with special education needs (LSEN) must be catered for in a way that eliminates barriers to learning (Department of Higher Education, 2013).

1.9 THE MERGED TVET COLLEGES

The study is a case study of an TVET college that is located in the city of Pietermaritzburg in the Midlands area. The birth of this college lies in the merger that occurred between five colleges that had belonged to the racially- segregated department of education in 2000. The TVET College has five campuses, described below. This case study is focusing on Campus X.

1.9.1 CAMPUS A

Campus A which is located in a previously Indian area had state of the art technology and facilities. The focus was Electrical programs and Financial and Business Management. They currently offer both NATED and NCV programs at their campus.

No.	Course	Division	NATED / NCV	Levels
1	Business Management	Business Studies	NATED	N4 - N6
2	Financial Management	Business Studies	NATED	N4-N6
3	Electrical Infrastructure Construction	Business Studies	NCV	Level 2 - Level 4
4	Finance, Economics and Accounting	Business Studies	NCV	Level 2 - Level 4
5	Hospitality	Business Studies	NCV	Level 2 - Level 4

TABLE 1: COURSES OFFERED AT CAMPUS A

1.9.2 CAMPUS B

At the time of the merger, Campus B had made an immense contribution to the development of technical education in the House of Assembly. The key focus at this campus is Business studies specializing in both NCV and NATED.

No.	Course	Division	NATED / NCV	Levels
1	Marketing Management	Business Studies	NATED	N4-N6
2	Management Assistant	Business Studies	NATED	N4-N6
3	Public Relations	Business Studies	NATED	N4-N6
4	Marketing	Business Studies	NCV	Level 2 - Level 4
5	Tourism	Business Studies	NCV	Level 2 - Level 4
6	Office Administration	Business Studies	NCV	Level 2 - Level 4

TABLE 2: COURSES OFFERED AT CAMPUS B

1.9.3 CAMPUS C

Campus C merged after going through several manifestations and name modifications, beginning as a satellite campus of a Technical College in Durban. This campus had a rich history of technical education in the House of Representatives that stretched back to the 1960s. This campus currently caters for theoretical Engineering programs, PLC training and Electronics.

No.	Course	Division	NATED / NCV	Levels
1	Mechanical	Engineering	NATED	N1 - N6
2	Electrical	Engineering	NATED	N1-N6

TABLE 3: COURSES OFFERED AT CAMPUS C

1.9.4 CAMPUS D

Campus D played a great role in the development of technical education in the KwaZulu Department of Education and Culture from the early 1950s. It was a vocational institution that also catered for weaving and brick making. The focus of this campus currently is that of NCV and workshops.

No.	Courses	Division	NATED / NCV	Levels
1	Civil	Engineering Division	NATED	N1-N6
2	Civil Engineering and Building Construction	Engineering Division	NCV	Level 2 - Level 4

TABLE 4: COURSES OFFERED BY CAMPUS D

1.9.5 CAMPUS X

Campus X, the campus where the research was conducted, is located in a previously Black township. This campus entered into the merger with well-resourced workshops and facilities. The campus was one of the pioneers in the area of technical education within the Department of Education and Training from the early 1980s. There are three units currently in operation at this campus; i.e. Business Studies (NATED and NCV), Engineering Division (NCV) and Curriculum Division (Fitting and Electrical Learnerships).

No.	Courses	Division	NATED / NCV	Levels
1	Human Resources Management	Business Studies	NATED	N4 - N6
2	Public Management	Business Studies	NATED	N4 - N6
3	Educare	Business Studies	NATED	N4 - N6
4	Engineering and related design	Engineering Division	NCV	Level 2 - Level 4
5	Education and Development	Business Studies	NCV	Level 2 - Level 4

TABLE 5: COURSES OFFERED AT CAMPUS X

The courses for each campus have been mentioned above to show that although NCV was brought in to replace NATED, NATED is still very popular due to the duration of the course compared to that of the NCV programs.

1.10 THE DIVISIONS AT CAMPUS X

The research was carried out at Campus X that caters for more than a thousand students currently, which is located in the outskirts of Pietermaritzburg. This campus has two main divisions, i.e. Business Studies and Engineering Division and two subsidiary divisions; Workshops and Learnerships. The Business Studies division offers NATED (N4 – N6) courses such as Public Management, Human Resources Management and Educare. The Business Studies division also offers an NCV (Level 2 – Level 4) course, namely Education and Development.

Campus X also has afternoon classes which begin at three o' clock (3pm) and end at five o' clock (5pm). These are for those students that could not be accommodated in the full time classes, due to a lack of classroom space, resources and lecturers.

The Engineering Division caters only for NCV (Level 2 – Level 4). This NCV caters for three specializations; i.e. Fitting and Machining, Automotive Repair and Maintenance and

Fabrication. Here students register for seven subjects. There are three fundamental subjects, i.e. Mathematics, English and Life Orientation and three vocational subjects, i.e. Engineering Fundamentals, Engineering Systems and Engineering Technology (These are Level two subjects). The first six subjects are generic whereas the seventh subject is the specialization. Students have the option to choose between Fitting and Machining, Automotive Repair and Maintenance or Fabrication.

1.11 THE STRUCTURE OF THIS THESIS

CHAPTER TWO: LITERATURE REVIEW

The range of this chapter was selected from national and international sources – mainly those of Rauner, Gamble, Winch, etc. Chapters from books and journal articles have been made use of and sources such as those mentioned provided the basis for the discussion based on the topic. The key concepts that were appraised were those of practical knowledge, propositional knowledge and work process knowledge.

CHAPTER THREE: RESEARCH METHODOLOGY AND DESIGN

This empirical research study was that of a qualitative nature and it investigated whether a relationship existed between propositional and practical knowledge. An exploratory, descriptive style of case study was made use of. The study fell into the Interpretivist paradigm and was therefore approached from a socio-cultural perspective.

The study took place at Campus X in the real life working context of the participants. The study was designed in a threefold manner. There were four data collection techniques used in order to gather the necessary information, curriculum analysis, observation of the lecture and lecturer interview and focus groups with students.

CHAPTER FOUR: CURRICULUM ANALYSIS

In this chapter, the analysis of the official NCV Level two ARM curriculum is presented. The intention of the NCV was to implement a more practical program and by conducting this analysis the result was to discover whether this was true or not. In his chapter the curriculum analysis methodology was discussed in detail and it was followed by findings of the LOs and a discussion of the main findings.

CHAPTER FIVE: ENACTED CURRICULUM

This chapter focused on the activities that took place in the classroom and the way in which the curriculum was carried out. In order to investigate the research question of *what is the relationship between practical and propositional knowledge in the teaching of the NCV ARM*

module, observation was conducted by me over a five day period in which it was investigated whether there was a relationship or not between practical knowledge and propositional knowledge. An interview with the lecturer was also conducted to identify the above.

CHAPTER SIX: EXPERIENCED CURRICULUM

This chapter focused on the students and the way in which they experienced the curriculum. Here two focus groups were carried out with five students in each group and the primary aim was to investigate how the students experienced the curriculum.

CHAPTER SEVEN: DISCUSSION AND CONCLUSION

In this chapter findings and conclusions are discussed and the chapter goes on to explain the relationship between the propositional and practical knowledge.

The next chapter, Chapter Two will discuss the theoretical concepts reviewed for the above study.

CHAPTER TWO

THEORETICAL CONCEPTS

2.1 INTRODUCTION

This chapter aims to explain how the study's three research questions are informed by theoretical concepts from Winch (2012), Rauner (2007), Gamble (2009a) and Glatthorn (1987). Firstly, I will focus the lens on studies that have been conducted in the TVET sector and the gaps that may or may not exist. Secondly, the explanation will move toward the different types of knowledge. Thirdly, there will be a discussion around propositional and practical knowledge. Fourthly, a discussion of Rauner (2007) is presented and thereafter I will move toward a discussion regarding the intended, enacted and experienced curriculum. Finally, I will move to discuss the concepts of knowledge. In summing up, I will discuss the relationship that may or may not exist between propositional knowledge and practical knowledge.

2.2 STATE POLICY ON TVET COLLEGES

2.2.1 THE WHITE PAPER AND THE FET NATIONAL POLICY REGARDING THE TVET COLLEGES

An aim of the White Paper (Department of Higher Education and Training, 2013c) is to create a structure that characterizes DHET's focal point and that enables it to focus its approaches and plans for the future. The White Paper (Department of Higher Education and Training, 2013c) states that it is a driving force to deepen the revolution of the entire post-schooling sector, improving the capability of the PSET system to meet the requirements of South Africa.

The White Paper was developed to enable the building of a PSET system that is able to contribute to eradicate the inheritance of apartheid. It aimed to assist in building a non-racial, non-sexist and affluent South Africa. Access to superior PSET is seen as a major dynamic in fighting poverty and inequality in our society. This PSET structure is developed in order to

be responsive to the requirements of the South African citizens and employers in the public and private sectors.

The White Paper highlights the vital task of Technical and Vocational Education and Training (TVET). It sets out the strategies that need to be put in place in order to transform the TVET even further. This will ensure two major aspects: on one hand that it has a rightful place in the post-school system and on the other hand ensuring that it becomes a clear path to a brighter prospect for its learners and for the country alike. This was developed to ensure that the policy will both strengthen and expand the public TVET colleges, allowing them to draw a large fraction of school leavers and become institutions of choice.

According to the White Paper (Department of Higher Education and Training, 2013c), one of the greatest challenges that may exist for PSET is to considerably increase admission to education and training over the subsequent twenty years. This is crucial not only to take into account the needs of the youth who complete school but also for those who, for some reason or the other have not completed schooling. PSET should be expanded in such a way that the needs of older people are also catered for, also referred to as Adult Education. This consists of those that did not have the opportunity to attend school but in need of education and training opportunities for them to live fruitful lives as both workers and citizens. This is where community colleges play a crucial role in offering skills to the marginalized population that have the potential to make a difference in the economy and the society at large, if empowered with education and skills.

To further justify the above, the national policy through which the NCV was introduced at TVET colleges in 2007, states that the NCV level 2 will provide for learning experiences in situations that are contextually significant to that particular vocational field in which the program is situated. The NCV will offer subjects in programs that will consist of both the academic knowledge and theory integrated with practical skills and values that may be specific to each vocational area (Department of Education, 2006).

2.2.2 THE NATIONAL DEVELOPMENT PLAN (NDP) AND THE TVET COLLEGES

According to the National Development Plan, many parts of the TVET sector are underperforming. Public colleges enrol a mere one-third of the higher education students

whereas they believe it should be the other way around. The main reason for this was the lack of funding and the lack of existence of a regulatory system to support the development of the structural environment (National Planning Commission, 2012).

The success rate at the TVET Colleges is extremely low with a four percent throughput rate from the NCV sector and the highest dropout level in NCV level two. The relationship between TVET and industry is a very weak one and an estimated sixty five percent of students did not find placement which is a requirement in order to complete relevant diplomas.

The National Development Plan (2009, p. 271) stated that:

> Studies have shown that while the South African higher education system functions relatively well, higher education faces major challenges: low participation rates, high attrition rates, a curriculum that does not speak to society and its needs, the enabling environment that allows every individual to express and reach full potential, and poor knowledge production that often does not translate into innovation. While knowledge production is the rationale of higher education, high quality knowledge production cannot be fully realised with a low student participation rate, a curriculum or environment that is alienating and does not articulate the vision of the nation, and an academic staff that is insufficiently qualified.

Four main ideas have been derived from that of the NDP by 2030: to increase the graduation rate of the NCV programme to seventy five percent, produce thirty thousand artisans per year, increase the enrolment figures to approximately 1.25 million students and create Community Education and TrainingColleges.

2.3 THREE KINDS OF KNOWLEDGE

Winch (2012, p. 2) states that epistemology conventionally considers three distinctive kinds of knowledge: knowledge by acquaintance, propositional knowledge (knowing that) and practical knowledge (knowing how). As individual concepts they are imperative for curriculum development yet the relationship that exists between them are just as important.

2.3.1. KNOWLEDGE BY ACQUAINTANCE

This type of knowledge deals with what a person knows by seeing, hearing, tasting or smelling. Knowledge by acquaintance is key, due to the point that it includes virtues and characteristics of "what is known that could be understood in another way"(Winch, 2012, p. 2). For example, it is possible to notice the beauty of a landscape without acknowledging other significant qualities that may exist.

An example that may exist within the classroom would be that it may be easy for the student to identify an engine in a vehicle but the student may not be able to identify the parts of that engine. The point of this concept is that the student is able to apply themselves to different situations or the lecturer may refer to different models of cars, hoping the students have knowledge of these through acquaintance. They know that a Porsche is different to a Toyota because they have seen these cars.

2.3.2 PROPOSITIONAL KNOWLEDGE (KNOWLEDGE THAT)

The conventional "definition of propositional knowledge," arising from Plato's Meno and Theaetetus, suggests that such knowledge, knowledge that something is the case, has three crucial components; truth, belief and justification. These components are identified by the view that knowledge is warranted as true belief. Knowledge, according to the conventional definition, is belief of a particular kind, belief that satisfies two essential conditions: (1) the truth of what is believed and (2) the justification of what is believed. While offering a variety of accounts of the belief condition, the truth condition, and the justification condition for knowledge, many philosophers have held that those three conditions are individually necessary and jointly sufficient for propositional knowledge (Gale, 2006).

Knowledge that is sometimes referred to as codified knowledge that are generally stored in books and journals (Wilson & Demetriou, 2007).

The concept knowledge that is also described as context free, guiding action and academic as referred to by Rauner (2007).

Paul Hirst (1973) argued that practices that validate and establish truths are closely linked to conceptual structures. In order to master these structures, you require inferential ability which is a form of practical knowledge. According to Winch (2012) inferential ability is that ability to employ identifiable processes for the attainment of the propositional knowledge with the subject. Inferential ability, in my understanding, is the ability to reach a logically made conclusion based on propositional knowledge that you may have previously gained. This once again emphasizes the point that the relationship between propositional knowledge and practical knowledge is inescapable.

2.3.3 PRACTICAL KNOWLEDGE (KNOWLEDGE HOW)

The ability of knowing how to do something is an epistemic capacity, in order to know how to do something generally requires a combination of propositional knowledge and knowledge by acquaintance (Winch, 2012). For example in order to drive a car you would have to be acquainted with the body of the car, the controlling mechanisms and also how to drive a car (practical knowledge) and at the same time you would have to know the rules of the road (propositional knowledge).

The three kinds of knowledge discussed above show that these three kinds of knowledge are linked through different kinds of relationship. Seemingly they cannot function on an individual basis; they rely on each other in order to make sense.

Morrow (2007) stated that practical knowledge must be learned by understanding and that propositional and practical knowledge are innately related to each other; that when teaching, lecturers must focus on both academic (propositional) and technical (practical) knowledge. This would be the ideal situation for the learner to be placed in.

2.4 PROPOSITIONAL AND PRACTICAL KNOWLEDGE

> It has been suggested that most learning programmes do provide learners with propositional knowledge or foundational competence. However within the context of applied competence, they should also offer learners opportunities to gain practical competence, not only in controlled and defined environments... but also outside the safety of the classroom and laboratory, in real-world contexts, where learners will be required to adapt and re-contextualise their learning to function successfully in complex and unpredictable circumstances. These opportunities enable the development of reflexive competence and self-improvement. In the assessment of learners too the notion of applied competence is often ignored and assessment focuses on foundational competence or in limited cases, practical competence. Rarely is assessment directed at reflexive competence (SAQA., 2000, pp. 17-18).

In the definition above it is said that practical work does not stand on its own and requires reflexive knowlege in order to function at its optimum. It is this link between propositional knowledge and practical knowledge that provides the foundation for problem-solving in new and untried situations. This allows the student to think rather than unconsciously performing previously-rehearsed routines.

Barnett (2006) states that a distinctive feature that tends to be present in any particular curriculum that leads to a vocational qualification is that it 'turns its face both ways': both to the theory or concepts of the discipline, and to the practical, real-world context. He restates that it requires a combination of knowledge, drawn from both non-empirical (conceptual / propositional) knowledge and empirical (everyday life / contextual / practical) knowledge, to ensure that the curriculum incorporates both knowledge (propositional) progression and occupational (practical) progression.

2.5 WORK PROCESS KNOWLEDGE

Rauner (2007) introduces a model that speaks of work process knowledge, this type of knowledge has been mentioned as a fundamental form of knowledge to vocational learning.

The European research network uses a working definition whereby work process is knowledge which:

1. Is directly necessary in the work process (as opposed for example to discipline-based / theoretical / propositional knowledge) - this could relate to a situation where the learners would go into the workshop at the campus and carry out practical activities in a simulated environment.
2. Is acquired in the work process itself, e.g. through experiential learning / practical knowledge, but does not exclude the application of theoretical knowledge - when students carry out tasks in the simulated workshop, they would have to possess propositional knowledge, in order to carry out (practical knowledge) the task efficiently and effectively.
3. Encompasses a complete work process, in the sense of designing, planning, performing and assessing one's own work in the context of workplace processes – the student must have the ability to carry out a process in a logical manner with all components completed in the correct order (F. Rauner, 2007, p. 56).

2.5.1 COMPETENCE AND WORK PROCESS KNOWLEDGE

Competence and work process knowledge seem to overlap. Rauner (2007) states that competence is where detailed and functional (practical) knowledge are acquired through solving complex problems without pre-determined solutions and corresponding specialized (theoretical) knowledge. This is similar to work process knowledge due to the point that both terms state that practical and theoretical knowledge are required for work process knowledge / competence.

There are various definitions of competence. Competence is the ability to carry out a task by fulfilling all necessary requirements of that particular task, in a logical manner. Different authors place different emphasis on either the competent action or on the understanding that underpins that action. For example, Jackson (1993) stated that requirements for competent work can be assessed behaviourally through observed work (practical knowledge) rather than through understanding the processes of the mind (propositional knowledge) that underpin the performance.

Eraut (2004), argues that competent behaviour does not only depend on being able to carry out certain tasks (practical knowledge) but also on the correct comprehension (propositional knowledge) of the ongoing situation so that appropriate action can be taken.

Ennis (1976), reiterates both Jackson (1993) and Eraut (2004) and states that competence integrates both knowledge of rules (propositional knowledge) and the ability to use them (practical knowledge) in a variety of typical situations.

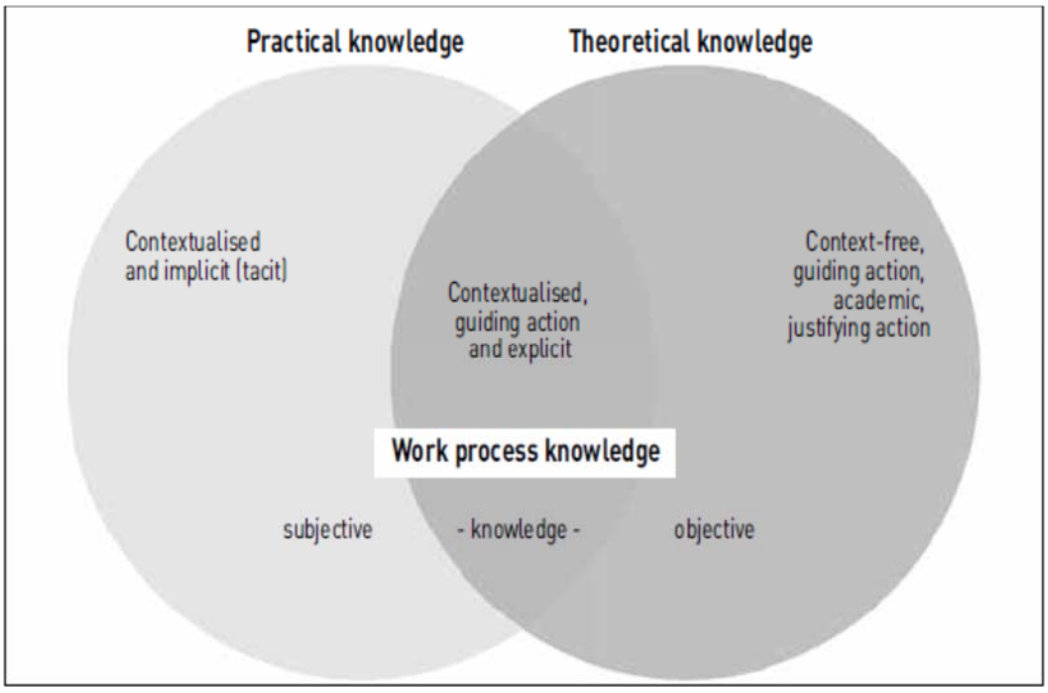


FIGURE 1: WORK PROCESS KNOWLEDGE AS A COMBINATION OF PRACTICAL AND THEORETICAL KNOWLEDGE AND OF SUBJECTIVE AND OBJECTIVE KNOWLEDGE (F. RAUNER, 2007).

This figure above in conjunction with the explanation regarding work process knowledge clearly shows how propositional knowledge (theory) and practical knowledge integrate and show how one is required in order for the other to be able to function at its optimal.

This model of Rauner's (2007) is similar to that of Gamble's (2009a) explanation in that they both argue that practical knowledge cannot be taken into consideration in the absence of propositional knowledge and vice versa, which leads to competence of a learner. In order to carry out a practical activity, there must be underpinning conceptual knowledge, i.e. propositional knowledge gained previously.

When investigating the various levels of curriculum, three key aspects were pursued: i.e. propositional (theoretical) knowledge, practical knowledge and work process knowledge.

These three aspects from Rauner (2007) are described in the following manner:

Category of knowledge	Description
Theoretical knowledge	Sometimes called codified knowledge that are stored in books and journals (Wilson & Demetriou, 2007) Sometimes referred to as propositional knowledge, knowledge that (Winch, 2012) Context-free, guiding action, academic (F. Rauner, 2007)
Practical knowledge	Referred to as the demonstrated ability to perform a set of tasks (Gamble, 2009a) Contextualised and implicit (F. Rauner, 2007)
Work Process Knowledge	Work process knowledge can be characterised in an initial approximation as a combination of practical and theoretical knowledge(F. Rauner, 2007) Also is contextualised, guiding action and explicit (F. Rauner, 2007)

TABLE 6: THREE KINDS OF KNOWLEDGE DESCRIBED BY VARIOUS THEORISTS

2.6. THE RELATIONSHIP BETWEEN PROPOSITIONAL AND PRACTICAL KNOWLEDGE

Propositional knowledge and practical knowledge rely on each other in order for the student to move to a higher level of thinking and understanding, where knowledge is not merely gained by learners, particularly in a vocational institution, but rather they need to be able to use it to do future tasks. However, research conducted by Papier (2012) showed that from the feedback received from TVET learners suggested that their expectations of practically oriented programs are not being met by the current programs being offered by the college. This tends to be due to the intense theoretical curriculum being offered, in the NCV divisions.

A study conducted in Sweden by Kilbrink (2012), contradicts Winch's (2012) argument and states that although there is a gap between theory and practice in technical vocational education, the relationship between propositional knowledge and practical knowledge is of a

dualistic nature, which means that the propositional knowledge and practical knowledge do not work together, but rather as separate entities.

The concern is with the interwoven relationship that should occur in a vocational context. This dualistic divide between the propositional and practical knowledge is criticized by numerous researchers (Allan, 2007). Rather it is argued that "A foundational assumption is that practice cannot be considered in the absence of knowledge (theory)" (Gamble, 2009a, p. 35). Gamble clearly agrees with Barnett (2006) as well as Winch (2010) that propositional knowledge and practical knowledge work together. Gamble (2009a), states that knowledge – practice can combine in four possible ways; everyday contextual knowledge, tacit conceptual coherence, theorized contextual coherence and contextualized conceptual coherence.

For this study I would draw mainly from the theories of Rauner (2007) and Gamble (2009a) because both Gamble (2009a) and Rauner (2007) say that propositional knowledge and practical knowledge work hand in hand, this is the relationship that the study will describe at Campus X in the NCV ARM field. The research aims to describe the ways in which propositional knowledge and practical knowledge do in fact rely on each other in the ARM course and the impact they may have on bridging the gap between propositional and practical knowledge gained and the learner being employable.

2.7 INTENDED, ENACTED AND EXPERIENCED CURRICULUM

The study will engage with the intended, enacted and experienced curriculum. The intended curriculum is the NCV curriculum documents, which are the SAGs for the ARM program. The enacted curriculum is that which is carried out by the lecturer during the presentation of his lectures. The experienced curriculum is that which is experienced by the learners during the learning process.

The table below describes the concepts of curriculum as the intended, enacted and experienced. Together, these three components of curriculum offer a foundation for understanding and revealing what constitute an inclusive account of curriculum for vocational education (Glatthorn, 1987).

Term	Glatthorn's (1987) categories
'Intended' curriculum	Ideal curriculum Actual curriculum Entitled curriculum
'Enacted' curriculum	Available curriculum Implemented curriculum Effective curriculum
'Experienced' curriculum	Achieved curriculum Attained curriculum Hidden curriculum

TABLE 7: CONCEPTS OF CURRICULUM AS INTENDED, ENACTED AND EXPERIENCED

2.7.1 THE INTENDED CURRICULUM

The intended curriculum is what the curriculum designers believe should happen as a result of the curriculum being implemented. Curriculum is rendered tangible by various planning processes that generally lead to the production of a formal document, i.e. in this case the SAGs for ARM Level two. These contain the subject outcomes that will be taught, what the learner is expected to be taught, assessments and standards that should be met (Glatthorn, 1987).

2.7.2 THE ENACTED CURRICULUM

The enacted vocational education curriculum consists of that which is actually implemented by the teacher. The curriculum that is enacted is shaped by the resources that are made available, the experience and skill of the lecturers, their understanding of what was intended, their values and the array of situational factors that determine students' experiences. Not only do the lecturers and resources available in the educational institution shape the curriculum, there are also a variety of aspects that shape the enacted curriculum. These factors include the

kinds of workplaces or practice settings, i.e. workshop facilities that are available to students within the programme, where these students can find support and guidance, and access to particular kinds of experiences that may be experienced in the workplace (Glatthorn, 1987).

2.7.3 THE EXPERIENCED CURRICULUM

The experienced curriculum is that which students experience when the enacted curriculum is being implemented (Smith, 1990). That is, if student learning is the most significant concern for educational requirements, then an imperative is the experienced curriculum: what and how students learn, interpret and construct knowledge from what is enacted. Students are active learners and not merely the unquestioning recipients they are thought to be.

Dewey (1916) suggested that the curriculum is grounded in the activity and interrelationships of persons. This view of the curriculum is seen as an interaction between the learner and the world that surrounds them, being acted upon, replicated, mirrored and experienced. That is, the experienced curriculum is what the individual experiences when they engage in activities and interactions that have been intended for them (Glatthorn, 1987).

The three curriculum concepts above all play an equally important role in the teaching and learning process and will impact directly on the learner and what they are anticipated to learn. It can be seen from the above that the vocational education curriculum needs to be considered as encompassing sets of socially derived and personally constructed concepts that are both multidimensional and complex (Glatthorn, 1987). The SAGs (intended curriculum) of the ARM will dictate how the curriculum is implemented (enacted curriculum) and thereby how it will be experienced (experienced curriculum) by the learners. This will be explained in more detail when the analysis of the SAGs of the ARM is completed.

These concepts are reiterated by Porter (2004) where he makes distinctions concerning the four levels at which curriculum analysis may take place: namely the intended, enacted, assessed, and learned curriculum. Table 12 below reveals the focus of curriculum analysis at the four levels.

Level	Primary Focus of Curriculum Analysis
Intended / Actual Curriculum	Analysis is concerned with examining the content (e.g., declarative, procedural, tacit, and situational knowledge) and the performance expectations, which is the level at which a student is expected to know and use the content as it is communicated in the documents and materials created to guide instruction and assessment.
Enacted Curriculum	Analysis is concerned with examining the content and the performance expectations as it is enacted by the instructor in the classroom and in the learning contexts
Assessed curriculum	Analysis is concerned with what knowledge, skills and values are actually assessed.
Learned / Experienced Curriculum	Analysis is concerned with measuring the content and level at which learners enact the performance expectations in a targeted context.

TABLE 8: PRIMARY FOCUS OF CURRICULA ANALYSIS AT EACH DIMENSION OF A CURRICULUM (PORTER, 2004)

The focus of this research was based on only three levels; i.e. Intended / Actual curriculum, Learned / Experienced curriculum and the Enacted curriculum when the curriculum analysis of the NCV ARM Level two SAG were carried out. The detailed description of the analysis tools are described in Chapter Four which outlines the findings of the curriculum analysis.

2.9 CONCLUSION

In this chapter I described the TVET curriuclum, investigated the different types of knowledge and discussed what different theorists believe regarding the propositional, practical and work place knowledge that may exist. It also discussed the relationship between propositional and practical knowledge, and described the three levels of curriculum that will be analysed in this study.

The next chapter focuses on the research methodology that was employed in this research.

CHAPTER THREE

RESEARCH DESIGN AND METHODOLOGY

3.1 INTRODUCTION

The methodology employed in any research study must be chosen with the utmost of care and consideration. This must be done, bearing in mind the nature of the study and the research questions that will be answered. The research design and methodology articulates the values that I possess around the study. It is my duty to establish the area that requires researching and then select the most appropriate paradigm, design and methodology. The research generates qualitative data, which is analysed in primarily qualitative ways, except the curriculum document which is analysed to generate quantitative data.

In this chapter I explain the research design and methodology that was used in this study. The case study method was employed due to the nature of the research and is explained in greater detail within the chapter. The paradigm of interpretivism is briefly touched on. I then describe the following data generation methods: curriculum analysis, focus groups with students, unstructured observation of NCV classroom activity, the interview that took place between myself and the lecturer and then I further discuss ethical issues and trustworthiness of the study including that of my role as the researcher and finally the chapter will be rounded up with a conclusion.

The data generation methods that were used in this research study will be discussed in great detail providing the purpose and the advantages and disadvantages that the data collection methods, may have had during the research study.

3.2 CASE STUDY

This research was conducted qualitatively using the case study approach. A case study approach was chosen to provide "a unique example of real people in real situations, enabling readers to understand ideas more clearly than simply by presenting them with abstract theories or principles" (Yin, 2009, p. 72).

A case study is a systematic and in-depth study of one particular case in its context (Rule & John, 2011, p. 4), where the case may be a person (such as a teacher, a learner, a principal or a parent), a group of people (such as a family or a class of learners), a school, a community, or an organization. Case studies aim to describe "what it is like" to be in a particular situation, so they are generally descriptive in nature; however, they can also be used to generate claims for further verification. The researcher aims to capture the reality of the participants' lived experiences of and thoughts about a particular situation (Cohen, Manion, & Morrison, 2011, p. 182).

The embedded, single case study method was employed and various data collection methods used. This case study was located at Campus X, where the focus was on the NCV ARM field, Level two. The case is the intended, enacted and experienced curriculum of the NCV Automotive Repair and Maintenance course.

The table below describes what kind of data was generated in order to answer the research questions.

Research Questions	Data collection methods	Whom / what	Curriculum area
What is the emphasis on the propositional knowledge and practical knowledge in the official curriculum documents? (i.e. the Subject and Assessment Guidelines of the Automotive Repair and Maintenance Curriculum)	Curriculum analysis	SAG	Intended / Actual curriculum
What is the emphasis on propositional and practical knowledge in the teaching of the NCV Automotive Repair and Maintenance module? (i.e. the enacted curriculum)	Observation and semi-structured interview	NCV ARM students and NCV ARM lecturer	Enacted curriculum
How do NCV (Automotive Repair and Maintenance) students at Campus X experience curriculum? (i.e. the experienced curriculum)	Focus groups	2 focus groups with five students per focus group	Experienced curriculum

TABLE 9: DATA COLLECTED IN THIS RESEARCH STUDY OF THE NCV ARM LEVEL TWO

The intention of using a case study methodology is due to its highly descriptive nature and the data collected will be that of rich information regarding particular situations, particularly the classroom situation where the NCV ARM lecturer was observed.

It is important that the researcher has the ability to be a good "questioner, listener, prober, able to make inferences and adaptable to changing and emerging situations" (Cohen et al., 2011, p. 296). I must also have the skill to gather and synthesize all the information from the various sources. Ethical considerations are of utmost importance especially that of confidentiality of the participants, trust and the participant must be comfortable during the process and be aware that should they feel uncomfortable they have the option to leave at any point that they wish. Subject knowledge expertise and excellent research skills are important and I should also be well prepared and ensure professionalism in my engaging with participants.

3.3 THE INTERPRETIVIST PARADIGM

This research is located within the interpretive paradigm, this is where the researcher does not aim to predict what people do but rather to describe and understand how people make sense of their worlds, and how they make meanings of particular actions (Bertram & Christiansen, 2014).

Interpretivists aim to understand the data that is being gathered from the participants' perspective. Multiple interpretations are recognized as equally valid. The findings are created and interpreted, and not 'found' as in post-positivist research. The interpretations are informed clearly by theoretical frameworks.

There are many assumptions that underpin the Interpretivist paradigm. Firstly, the purpose is to understand the meaning which informs human behaviour. Secondly, there is not one set of reality or truth but rather there are sets of realities or truths which are historical, local, specific and non-generalizable (Guba & Lincoln, 1994). Thirdly, it is recognized that the results are just not 'out there' waiting to be found or discovered by the researcher, but they are created through interpretation of data (Guba & Lincoln, 1994).

Trustworthiness within this paradigm is strengthened by detailed descriptions of the data. It is essential for the data to reveal the experiences of the respondents. The researcher must show clearly how they have generated and analyzed the data and how they have arrived at the said conclusions. Room must be allowed for the point that multiple constructions of the same idea can be concluded. Although the reseacher viewed the data from one view point, another researcher may see it in a different way depending on the theoretical lens (Bertram & Christiansen, 2014).

3.4. DATA COLLECTION METHODS

This study entailed a range of data collection methods. The purpose of these methods was to build up a rich and detailed case study of the intended and official curriculum. There are four main data collection methods employed in this research: (1) Curriculum analysis (2) Observation of four teaching sessions, (3) Interview with Automotive and Repair lecturer and

(4) Focus groups with Automotive and Repair students. These methods are described in more detail below.

Firstly, a curriculum analysis of the NCV ARM Subject and Assessment Guidelines was carried out. The primary focus of this analysis was the proportion of propositional and practical and work process knowledge within the official curriculum.

Secondly, an unstructured observation, with field notes, was used to observe the NCV Level two ARM lecturer in order to describe the relationship between the practical knowledge and the propositional knowledge that may be gained by the student.

Thirdly, a semi - structured interview was carried out with the ARM lecturer. This was done in order to gain detailed information about the instructional practices that may or may not be used by the lecturer. The questions that were asked were that of an open ended nature to ensure detailed information was received.

Finally, focus groups were carried out with the students to obtain an enriched understanding of their experience of the NCV ARM course.

3.4.1 CURRICULUM ANALYSIS

An analysis of the NCV ARM Level two curriculum document was conducted. This was to determine whether the curriculum leans more toward propositional knowledge or practical knowledge and what is the relationship in the curriculum between the propositional knowledge and practical knowledge.

Porter (2004) defines curriculum analysis as the methodical process of isolating and analyzing features of a curriculum. Curriculum analysis generally involves describing and isolating a particular set of content, in this case the ARM SAG, in a curriculum. I analysed the Learning Outcomes that illustrate what propositional and practical knowledge a student will gain.

Content of the official curriculum document is defined as the domain- specific declarative, procedural, tacit and situational knowledge targeted by the official curriculum document (Department of Higher Education, 2013). Assessment standards are generally defined as the range of knowledge that a student is expected to know (propositional knowledge) and employ

(practical knowledge) the content as a result of the instructional activities and assessments conducted in the curriculum.

3.4.2 UNSTRUCTURED OBSERVATION OF NCV CLASS ROOM ACTIVITY

Unstructured observation means that the researcher does not have a checklist where boxes are ticked as the observation is carried out but rather this is a description of the classroom process as the researcher views it. Regardless of whether the observation is structured or not, it is impossible to capture every piece of information and activity from that observation. Field notes are good for the researcher, this is where they write notes as the observation continues and this helps them to remember certain elements in the observation that made an impact on them (Bertram & Christiansen, 2014).

The purpose of the observation was to enable the researcher to draw together information regarding a wide range of aspects. The research was that of an overt nature whereby the 'subjects' are aware of its existence (Sapsford & Jupp, 2006). This is where the lecturer and the students were aware of the research being conducted and the purpose of the research thereof.

The unstructured observation was carried out by a non-participant observer, this is where the observer does not directly interfere in any way during the lesson but purely observes the lecture being conducted and writes field notes where necessary. However, there would be a difference in the behaviour of both the lecturer and the students; this is due to the Hawthorne effect.

Observations can be intrusive, even if the researcher does not interfere, observation itself changes the dynamics of the situation (Bertram & Christiansen, 2014). This in many cases is unavoidable due to the point that the presence of a third party during a lecture causes both the lecturer and the learners to behave differently. Although the lecturer and the learners were briefed before the observations began and taking into account that the observation was non-participant and silent did not make a difference. Students tended to behave differently as soon as they were aware that the camera was recording and on the same note so did the lecturer, this was due to the Hawthorne Effect.

The advantages of the conducting observations are that of gaining first-hand insight into the classroom teaching and learning processes. This means that I would not have to rely on the opinions and viewpoints of others that are gained from interviews or questionnaires but would rather make her own deductions from what she has viewed.

Possible disadvantages would be that unfortunately not everything can be observed in any given situation. For example, while the researcher is noting down information about what was said by the lecturer she may not be able to note down what each response was from the learners. It is important for the researcher to be selective in what is required and what isn't. I video recorded the observations. This enabled me to go back and relook at the events and how they unfolded. It also assisted me to take note of certain observations that were missed during the actual observation; however this does not imply that every aspect of the observation was captured.

The main aim of this unstructured observation was to describe the relationship between propositional knowledge and practical knowledge in the classroom context. During this research only one lecturer was observed. This observation was done over a period of two weeks and the lecturer was observed for approximately sixteen hours. These sixteen hours were broken up into four sessions, of four hours each; this was done according to the lecturer's class timetable.

Another possible disadvantage was where the researcher did not understand certain interactions that occurred in the classroom due to the subject content or the nature of the class that may have taken place. In this case, during the focus group sessions many of these misunderstandings were clarified, due to questions being asked to the class regarding the matters in question.

The NCV ARM lecturer consented to being observed in the classroom situation and this gave me an opportunity to get a better understanding of the way in which the teacher's thoughts and opinions regarding lecturing and assessment become evident in practice. This was also an opportunity to determine the extent to which there is a robust relationship between what the lecturer has stated during the interview compared to what is being carried out in the classroom.

The unstructured observation took place with the NCV ARM Level two lecturer whereby he was observed teaching for a period of approximately four hours. The lessons were video recorded. The main aim of this observation was not be to critique the lecturer, but rather to establish in what ways the lecturer draws from both the propositional knowledge and practical knowledge when delivering the lesson to the learners.

3.4.3 INTERVIEW WITH ARM LECTURER

A semi structured interview was employed to ensure that the lecturer would be able to speak freely about the research questions. This interview method was used to find out what knowledge the lecturer has regarding propositional and practical knowledge and the impact that it may have in the classroom as compared to the official curriculum document. Secondly, the interview was also conducted to investigate how the lecturer understands the relationship between propositional or practical knowledge in the NCV ARM field. Lastly, this was carried out to investigate the attitude and beliefs of the lecturer regarding the two types of knowledge mentioned above.

The NCV ARM lecturer was requested to engage in an unstructured interview and asked open ended questions to discover his thoughts, opinions and suggestions regarding the concepts of propositional knowledge, practical knowledge and the relationship that may or may not exist between them. It also gave me a chance to get an understanding of his thoughts and opinions.

The interview conducted at Campus X was conducted with the NCV ARM Level two lecturer. This was conducted in order to get a better understanding of his teaching philosophy. The reason for the interview was to get detailed information about the teaching practices that may or may not be used by the NCV ARM lecturer. The questions asked were of an open ended nature to ensure detailed information was received.

The interview was also recorded by means of audio recording and the guidelines expressed above in the observation section were observed. The audio material was kept and used as required, however this was only for my use and was not given to any other researcher or other person due to confidentiality. The audio would be kept in a safe and secure environment for five years and then destroyed.

An advantage of conducting interviews is that the interview takes place face-to-face and I would have the opportunity and ability to clarify any misunderstandings as it may occur. During the interview I was able to ask probing questions to ensure that I was able to gain all the necessary valuable information possible. An immense advantage to conducting interviews is that there is minimal writing for the interviewee to do, in most cases interviewees prefer talking rather than writing long and fairly detailed explanations. Verbal interviews are also advantageous in that I would receive more detailed data compared to that of a questionnaire or survey.

There are various disadvantages when conducting interviews. Firstly, the interview tends to become a social encounter rather than an interview. A social encounter implied that I did not want the interview to be one that is too formal which may have made the lecturer nervous and uncomfortable but rather an interview where there was more of a conversation and made the lecturer feel at ease to speak. The relationship between the lecturer and I could have been influenced by power relations, I needed to be aware of how my position, as a researcher and colleague, could influence the information that may be received from the interviewee. In my opinion, one of the greatest disadvantages is that of the amount of textual data that may develop from the transcription of the audio recording.

However, this amount of data can either be a positive factor for me as a researcher or a negative factor. It can be a positive factor in that if I keep in mind what is required for the analysis of the data then that information which is required from that transcript would be of great value. However, if I have no understanding of what information is required from the transcript, it could be devastating and very uninspiring.

There must be an element of trust that exists between me as the researcher and the interviewee to ensure that the process runs smoothly and the interviewee feels comfortable to answer all questions that are posed to him. The element of trust was no real issue due to the point that the interviewee had a working relationship with me the researcher. The interviewee should not be placed under any uncalled for pressure and should be relaxed enough to answer questions at his own pace. As the researcher I tried to not put any unnecessary pressure on the interviewee and repeated the point that he could exit the interview at any point that he wished to.

3.4.4 FOCUS GROUPS

A focus group is a form of a group interview, which takes place as an interaction between the participants, rather than a question and answer session. The interaction will assist in leading to data and outcomes regarding the topic being discussed. The benefits of the focus group is that they are focused on a particular topic, they are very inexpensive regarding the time factor to carry out and a great deal of data can be gathered in a short space of time. It is important for me to make sure that the agenda of the focus group is clear and the focus is maintained. Drawbacks of the focus groups are that they tend not to yield numerical, quantifiable and generalizable data and that data may be difficult to analyse. Another drawback can be where certain participants in a group speak more than others and the quieter participants become overshadowed. (Cohen et al., 2011).

The focus group was viewed as a form of a group interview. The purpose of the discussion was explained to the focus group in great detail and with the utmost of care, taking into account that these are learners.

At the time of the research being conducted, there were approximately sixty students registered for the NCV ARM Level two course at Campus X. I made use of non-probability sampling particularly that of convenience sampling due to the point that the students are selected because of their convenient accessibility and proximity.

One of the reasons this sampling was used was because they were easy to recruit for the intended study. In all forms of research, it would be ideal to research the entire population but in most cases, such as this one, the population is just too large that it was impossible to include every individual. A great advantage is that this sampling is fast to conduct and inexpensive.

I have used a sample of ten NCV ARM students which was drawn from the sixty NCV ARM registered students at Campus X. The sample of ten students was divided into two focus groups whereby one group was that of high achievers and the other group of the average achievers. Determination of achievement level was concluded by studying their results once their test one had been concluded at the campus.

The group was encouraged to converse with each other rather than with me, this would optimistically provide a more comfortable environment for the students to gain as much information as possible.

A contingency plan was put in place should the need arise, a Zulu speaking co-researcher was asked to assist to facilitate the focus group, this would cater for the learners should they not understand the questions asked. This is due to the fact that at Campus X, the majority of the learners are Zulu speaking and an interpreter may need to intervene, to ensure the message is clear and understandable. At the same time, most students are able to converse in English therefore the interpreter would be used only if necessary. During the focus group the interpreter was not used since the students conversed very well using the English language.

First, a pilot focus group was conducted to iron out any issues that may have arisen. The pilot went smoothly and it was during the pilot focus group that it was realized that there was no need for an interpreter. The pilot group consisted of five students chosen randomly from the NCV ARM Level two. I also realized that the language used had to be simple in order for the learners to understand what is being asked. In this pilot group, the students were very talkative which is very good when collecting data, however at the same time the students tended to move off topic and they would need guidance to sway them back onto the right track.

3.5 ETHICAL ISSUES

Ethical concerns are an integral part of any planning and implementation of research. There are three ethical principles discussed by Terre Blanche and Durrheim (1999), autonomy, non-maleficence and beneficence.

Autonomy is whereby consent from the relevant parties is voluntary and informed. The process should be explained clearly and in a simple, clear language that is understood by all. In the case of my study, the study was explained in English. The language used was simple and clear to ensure that the students understood what was required from them. This ensured that information disseminated took into account the learners' language needs. It was also made clear that all participants were given the option of exiting the data collection process at any time that they so wish should they feel intimidated or are put at risk in any way.

Firstly, consent was obtained in respect of the observation of the NCV ARM lecturer before proceeding with any research. This would be overt observation due to the fact that the lecturer would be made aware that I would be present to observe what is being done in the classroom context and not to critique his delivery techniques. According to Pearson (2009), in some cases overt observation can be seen as reliable with a few biased outcomes. However, overt observation could disturb the natural setting; precautionary measures would need to be put in place to prevent disruptions of any nature. During the observation I was a silent, non-participant observer and ensured that the class being conducted was not disturbed in the least.

Secondly, consent was obtained from the students that participated in the focus groups. I made certain that all students were comfortable participating in the focus group and that if they felt at risk in any sort of manner they were allowed to leave.

Finally, consent was obtained for the interview conducted with the NCV ARM lecturer, and all rules discussed above were taken into account. This consent was obtained together with the consent for the observation.

Non-maleficence is where the risks of this research would be taken into consideration. Should any risks have occurred, they would have been investigated and the research adjusted accordingly. This is especially significant where students are in the actual workshop at the campus and my presence as a researcher may distract them and place them in any danger.

The final principle to be employed is that of beneficence, with the anticipation that this study may assist other students and or researchers in the future.

Anonymity and privacy were respected at all times. This means that care and consideration was taken in deciding whether or not sensitive information should be recorded. Identities and research records will be kept confidential whether or not an explicit pledge has been made. The right to remain anonymous will be respected unless a comprehensible understanding to the contrary has been reached. I will take the responsibility to ensure that suitable safety measures are taken to protect the confidentiality of the participants' data. For example, names and any information from which identities could be contingent (e.g. locations) will be removed.

The undertaking of good ethical research infers that I have an obligation to clearly spell out what is meant by anonymity and confidentiality to the research participants early in the research process. I explained the steps that the participants would have taken to ensure protection of the respondents' identities and I provided assurance concerning security measures for the storage and disposal of any data collected during the research process. Moreover, research participants were made aware that they are entitled to reject particular forms of data-gathering (e.g., use of devices such as tape-recorders and video cameras) or opt out of the research process at any given time for any reason whatsoever.

With regard to the video recordings various factors were taken into consideration. Firstly, confidentiality of all documentation was ensured to the providers of the relevant information. Secondly, the supervisor and I will be responsible for security of the data and ensure that data is not exposed unethically. Thirdly, the data will be kept for a period of five years, should the availability of the data be required. Fourthly, there will be different formats in which the data will be stored, namely; videos, audio recorder, hard copies of documents. Once the data has been transcribed the data will be erased / deleted and only the transcribed information will be retained. Fifthly, and seemingly the most practical way to store data of such a nature would be to place them in a sealed box and store them in a safe environment, such as store room or a place where it could not be reached by prying hands. Lastly, documents will be shredded and video tapes / voice recorders erased after 5 years.

3.6 TRUSTWORTHINESS OF THE STUDY

In a qualitative study the researcher may get drawn into a more personal relationship with the participants. A reason for this would be due to the many hours that are shared between the researcher and the participants. The researcher should also be vigilant about the way in which data is categorized from the perspectives, qualities, attitudes and experiences that may be held (Walker, 2010).

Walker (2010) states that objectivity can be sustained whilst some believe that subjectivity is the defender of qualitative research. Words are used to build reality and the way in which the words are used will determine their true meaning. A non - participant observer will spend

time engrossed in the study, and not be seen or heard by the participants. The idea is to gain a deep and dense understanding of the knowledge that is emerging (Walker, 2010).

This is the first time that research of this nature has been carried out at Campus X regarding this NCV ARM Level two and this study has no benchmark to contrast itself with apart from the several school based classroom research that have been conducted. This study is limited to but one subject compared to the many subjects accessible to students in the NCV programme, which means that it is not a decisive pathway but rather surfaces the way ahead for potential research.

It must be taken note that research of this nature is not generalizable, due to the college's uniqueness regarding the subject offerings, lecturers and resources.

3.6.1 THE ROLE OF THE RESEARCHER

As I am permanently employed at Campus X as a lecturer, this made the interview, observation and focus groups easier to conduct since I was familiar with the NCV ARM lecturer and students alike.

All participants that were involved in the collecting of data seemed to be quite calm, responsive and keen to assist as far as they could. The participants didn't seem to be holding back any information and spoke very openly regarding the subject matter, during the focus group and the interview. In certain instances the lecturer being interviewed or the students that participated in the focus group may have given answers that they thought I wanted to hear. A point to bear in mind is that because of my knowledge of the context, of the college and its functionalities this may have influenced the way in which the responses were interpreted.

3.7 CONCLUSION

This chapter set out to discuss the way in which my research my conducted and how data was collected. The research is based on a case study method which continued to discuss the data collection methods that were employed here. Ethical issues and trustworthiness of the study were also briefly looked at.

The following three chapters will explain the data collection techniques in more detail and will also give presentations of data, findings and interpretations, where necessary.

Chapter Four provides a discussion based on the enacted curriculum whereby a curriculum analysis was carried out on the official curriculum.

Chapter Five describes the enacted curriculum which included the classroom observation and analysis and the interview with the ARM lecturer and analysis thereof.

Chapter Six explores the experienced curriculum, which discusses the focus groups that have been conducted.

CHAPTER FOUR

CURRICULUM ANALYSIS OF THE NCV ARM SAG

4.1 INTRODUCTION

In this chapter, the following question will be addressed: What is the emphasis on propositional knowledge and practical knowledge in the National Certificate Vocational for the Automotive Repair and Maintenance Curriculum i.e. the Subject and Assessment Guidelines for Automotive Repair and Maintenance Level two?

In order to do this, the chapter will be structured in the following way. A description of the official curriculum document which was analysed will be given, this will be followed by a discussion of the intended curriculum and I will move on to explain the National Certificate Vocational (NCV) Automotive Repair and Maintenance (ARM) subject and assessment guidelines (SAG). The curriculum analysis methodology will be discussed in detail, followed by the findings of the Learning Outcomes (LOs), I will then move on to the analysis of the SAG, with a presentation of the findings and finally a discussion of the main findings will be given. This chapter will round off with a conclusion of the curriculum analysis of the NCV ARM SAG.

This chapter presents an analysis of the SAG of the NCV ARM Curriculum Level two i.e. the official curriculum. The NCV Curriculum is referred to as the Subject and Assessment Guidelines, commonly referred to as the 'SAG'. This curriculum analysis has been conducted in order to interpret whether the curriculum leans more toward propositional knowledge, practical knowledge or if there is a 'balance' in the relationship between propositional knowledge and practical knowledge, which could be described as work process knowledge. Rauner (2007, p. 56) states that *"work process knowledge can be characterized in an initial approximation as a combination of practical and theoretical knowledge"*.

4.2 CURRICULUM ANALYSIS OF THE SAG NCV ARM LEVEL TWO

Porter (2004) defines curriculum analysis as the systematic process of isolating and analysing targeted features of a curriculum. The most common practice relating to curriculum analysis is to describe and isolate a particular set of content in a curriculum. In this study I analysed the LOs that illustrate what the students are required to know (propositional knowledge) and do (practical knowledge) with the content.

The SAG is regarded as the *intended curriculum or the official curriculum document*. The intended curriculum describes the content and LOs that are intendedto be learned. The curriculum provides guidelines that often state the outcome of the course / qualification and that which would ultimately be realised and assessed against a particular benchmark (Billett, 2011).

The Department of Higher Education and Training (DHET) (2013a) has stated that the SAG offers the lecturer ways of developing and implementing a consistent, integrated assessment system of learning. The document also goes on to explain the internal and external assessment of the ARM program.

The SAG is in direct contrast to the outcomes based qualifications designed within a framework developed by the South African Qualifications Authority **(SAQA)**, where knowledge content is implicit and left to the lecturer's discretion. The new curriculum policy i.e. the SAG of the ARM is explicit in specifying the specialist knowledge associated with each occupational field to which the new certificate relates. It also makes clear that the acquisition of this knowledge will be assessed by a substantial component of external examinations (Department of Higher Education and Training, 2013a).

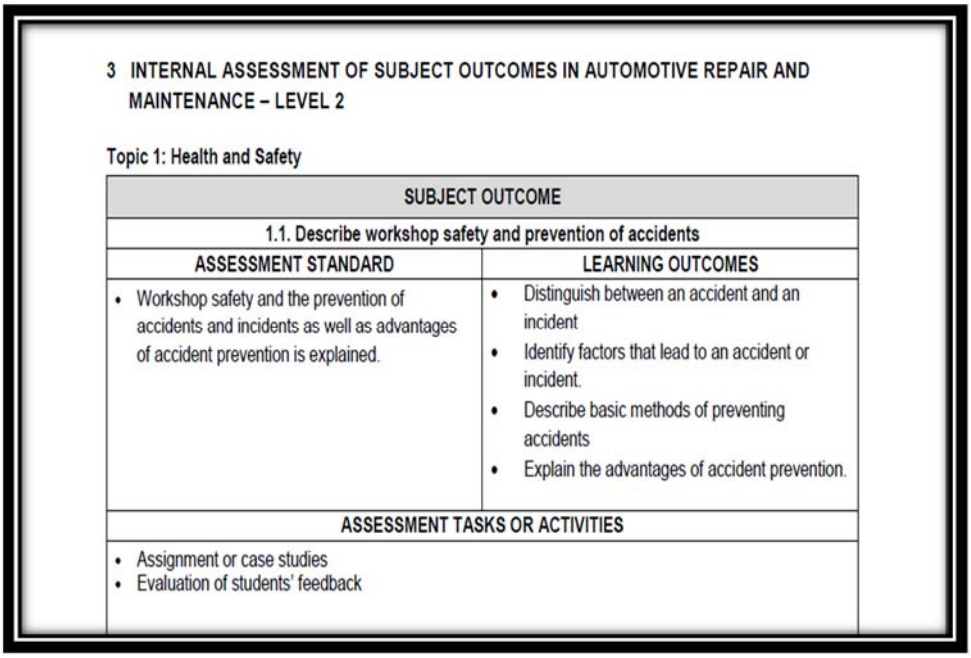
4.2 THE ASSESSMENT IN THE NCV

These assessment objectives are underpinned by the National Qualifications Framework (NQF). The objectives are as follows:

1. Create an integrated national framework for learning achievements
2. Facilitate access to and progression within education, training and career paths
3. Enhance the quality of education and training
4. Redress unfair discrimination and past imbalances and thereby accelerate employment opportunities
5. Contribute to the holistic development of the student by addressing:
6. Social adjustment and responsibility
7. Moral accountability and ethical work orientation
8. Economic participation and Nation building (Department of Higher Education and Training, 2013a, p. 3)

The Assessment Guidelines are broken up into four main parts (as seen in figure 1 below):

1. The Topics
2. The Subject Outcomes
3. The Assessment Standard
4. The Learning Outcomes



3 INTERNAL ASSESSMENT OF SUBJECT OUTCOMES IN AUTOMOTIVE REPAIR AND MAINTENANCE – LEVEL 2

Topic 1: Health and Safety

SUBJECT OUTCOME	
1.1. Describe workshop safety and prevention of accidents	
ASSESSMENT STANDARD	LEARNING OUTCOMES
• Workshop safety and the prevention of accidents and incidents as well as advantages of accident prevention is explained.	• Distinguish between an accident and an incident • Identify factors that lead to an accident or incident. • Describe basic methods of preventing accidents • Explain the advantages of accident prevention.
ASSESSMENT TASKS OR ACTIVITIES	
• Assignment or case studies • Evaluation of students' feedback	

FIGURE 2: PAGE 13 OF THE SAG, SHOWING THE STRUCTURE OF THE SAG NCV ARM INTERNAL ASSESSMENT FOR ONLY SO 1.1

The above figure is merely included to show the structure of the SAG, I have only analysed the LOs, which assisted in generating data regarding the different types of knowledge investigated during this research.

4.2.1 TOPICS IN THE NCV SAG

There are twelve topics in the NCV ARM. The topics state the main idea of the area that will be taught. Each topic contains individual LOs and these were used during the analysis of the curriculum which is presented below. The twelve topics are as follows:

	Topic Number:	Topic:
Topics as per the NCV SAG ARM Level two	Topic One	Health and Safety
	Topic Two	Tools Applicable to the Auto Trade
	Topic Three	Measuring Equipment
	Topic Four	Vehicle Lifting Equipment
	Topic Five	Fundamentals of Engine Technology
	Topic Six	Bearings
	Topic Seven	Batteries
	Topic Eight	Lubrication Systems
	Topic Nine	Wheels and Tyres
	Topic Ten	Cooling Systems
	Topic Eleven	Lights and Automotive Electrical Systems
	Topic Twelve	Servicing a Vehicle

TABLE 10: THE TWELVE TOPICS CONTAINED IN THE SAG NCV ARM LEVEL 2

4.2.2 ASSESSMENT STANDARDS

The Assessment Statndards (AS) will occur against the NCV ARM Level two and this will therefore be norm and criterion referenced. The AS must be seen within the context of the Total Quality Management System (TQMS) to assure validity, reliability, transparency, consistency and fairness. It is governed and managed by Education and Training Quality Assurance bodies (ETQA) and the Department of Education (DoE) according to Umalusi guidelines. The AS is conducted according to a planned and structured cycle and is subject to ETQA and DoE (Umalusi) verification process (Department of Higher Education and Training, 2013a).

Here an example of the AS is provided since it was not part of the major study; it was included merely to show how the SOs and LOs are assessed.

SO as per NCV, SAG NCV ARM Level two			
Topic Number	One	One	One
Topic	Health and Safety	Health and Safety	Health and Safety
SO Number	1.1	1.2	1.2
SO	Describe workshop safety and prevention of accidents	Explain and perform good housekeeping in an automotive repair workshop	Explain and perform good housekeeping in an automotive repair workshop
AS	Workshop safety and the prevention of accidents and incidents as well as advantages of accident prevention are explained.	The advantages of good housekeeping in the workshop are described.	Tools and equipment are cleaned and correctly stored after usage.

TABLE 11: SO FOR TOPIC SHOWN ABOVE INCLUDING AS FOR THE RELEVANT SO

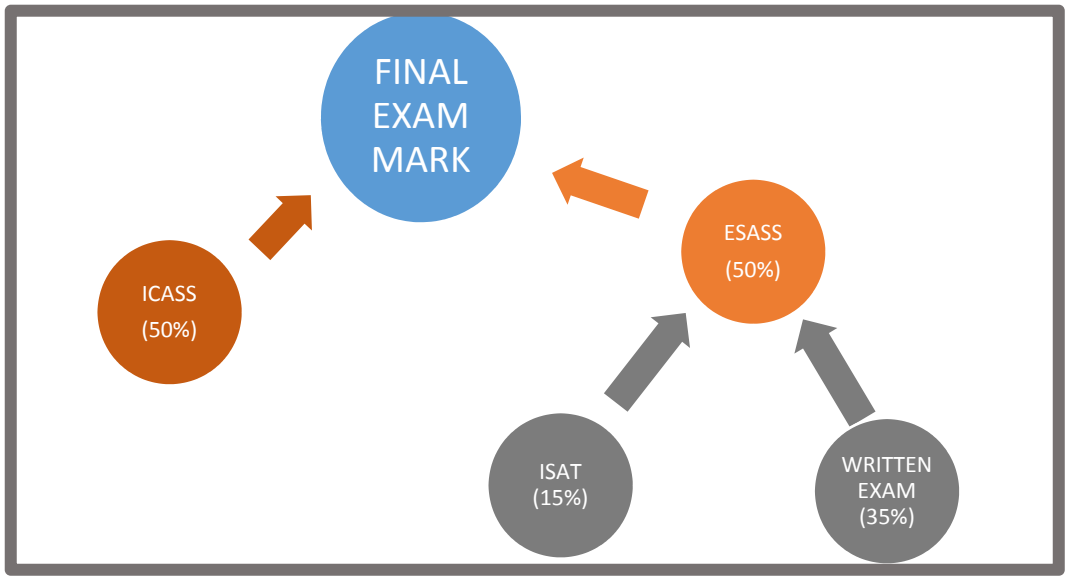
4.2.3 INTERNAL AND EXTERNAL ASSESSMENT OF NCV ARM

There are two main components of the assessment of the NCV ARM program. These are the *internal continuous assessment* (ICASS) and the *external summative assessment* (ESASS). The propositional knowledge component of the internal continuous assessment (ICASS) is where the student's knowledge is assessed. These assessments are carried out throughout the year and these may include activities such as role plays, projects, tests, class activities, etc.

The external summative assessment (ESASS) is whereby examination papers are set to the requirements of the LOs as stated in the SAG for ARM Level two. A compulsory component of the ESASS is that of the Integrated Summative Assessment (ISAT), which is the major practical component of the NCV ARM (Department of Higher Education and Training, 2013a).

The ISAT is that which draws on the student's collective learning that would have taken place throughout the year. Collective learning would refer to both the propositional and practical knowledge gained throughout the year. The ISAT task requires a student to apply the knowledge that he or she has gained in the classroom to a simulated working environment. The ISAT is the most significant test of a student's ability to apply their acquired skills. This is where the student will use the propositional knowledge gained throughout the year and apply it to the practical component of the course, required when in a simulated environment. This reiterates what Rauner (2007) states that work process knowledge, in this case the ISAT, is a combination of propositional knowledge and practical knowledge.

FIGURE 3: A MODEL REPRESENTING THE CALCULATION OF THE FINAL EXAMINATION FOR THE NCV ARM LEVEL 2 STUDENT



The above figure shows the way in which the final year mark is calculated. A key point to note here is that the ISAT which should be a major practical part of the NCV ARM carries a mere fifteen percent (15%) toward the students final exam mark and the ICASS which is the more propositional component carries a significant fifty percent (50%) toward the final mark. It is important to note that this is not in line with the reasoning as to why the NCV was implemented. The NCV was implemented to increase the amount of practical activity carried out in the program and this should be reiterated in the weighting of the marks but unfortunately is not.

4.2.4 LO OF THE NCV SAG ARM

LOs are expressed as specific statements that require a specific action or skill that the learner should be able to do after the propositional knowledge has been cascaded to him. Each learning outcome must contain:

1. A performance indicator, which provides the detailed requirements for the achievement of the outcome
2. A range statement, which describes the scope and parameters for achievement
3. Assessment criteria, which are used to measure how well the learners achieve the outcome (Burns & Marais, 2009).

LOs have a defined purpose/s with the intention to provide learners with applied competence and a basis for further learning. The LOs were analysed to establish the extent to which the curriculum focuses on propositional knowledge and practical knowledge.

The LOs that were analysed were those from the NCV SAG ARM Level two. Below is a table showing LOs from Topic One only, since the LOs will be discussed more explicitly towards the end of the chapter.

LOs as PER THE SAG ARM LEVEL TWO			
Topic Number	Topic	Learning Outcome Number	Learning Outcome
Topic One	Health and Safety	1.1	Distinguish between an accident and an incident
Topic One	Health and Safety	1.1	Explain the influence of hazards such as temperature, chemical burns and electric shocks in an automotive workshop
Topic One	Health and Safety	1.1	Identify factors that lead to an accident or incident.
Topic One	Health and Safety	1.1	Describe basic methods of preventing accidents
Topic One	Health and Safety	1.1	Explain the advantages of accident prevention
Topic One	Health and Safety	1.2	Describe the advantages of good housekeeping in the workshop
Topic One	Health and safety	1.2	Clean and store tools and equipment used in the correct places
Topic One	Health and Safety	1.2	Explain the importance of keeping records on accidents and incidents
Topic One	Health and Safety	1.3	Describe the reasons for using colour coding in an automotive workshop
Topic One	Health and safety	1.3	Identify colour coding and safety signs used in an automotive workshop
Topic One	Health and Safety	1.3	Explain the purpose of different safety signs
Topic One	Health and Safety	1.4	Explain the purpose of the Occupational Health and Safety Act (OHS)

LOs as PER THE SAG ARM LEVEL TWO			
Topic Number	Topic	Learning Outcome Number	Learning Outcome
Topic One	Health and Safety	1.4	Identify the requirements of the Occupational Health and Safety Act (OHS) applicable to an automotive workshop
Topic One	Health and Safety	1.4	Describe the duties, rights and liabilities of employers and employees according to the Occupational Health and Safety Act (OHS)
Topic One	Health and Safety	1.5	Describe the causes of air pollution in an automotive workshop
Topic One	Health and Safety	1.5	Identify various types of possible fires and describe how to extinguish them
Topic One	Health and Safety	1.6	Identify and describe the function of PPE that must be worn in an automotive workshop
Topic One	Health and Safety	1.6	Describe unsafe and/or dangerous objects and clothes unsuitable to wear in an automotive workshop
Topic One	Health and Safety	1.6	Explain the importance of practising good personal hygiene in an automotive workshop
Topic One	Health and Safety	1.6	Remove and replace bearings from a shaft
Topic One	Health and Safety	1.6	Dispose of all the waste materials, fluids, lubricants, filters and other rubbish according to safety, health and environmental procedures.
Topic One	Health and Safety	1.6	Clean all tools and equipment that were used and store them in their appropriate storage area according to workshop procedures.
Topic One	Health and Safety	1.6	Complete the required documents to record servicing activities

TABLE 12: LO AS PER SAG NCV ARM PAGES 12 -15

4.3 METHODOLOGY EMPLOYED TO ANALYSE SAG

The methodology used in this research was that of a qualitative nature making use of deductive analysis. Predetermined categories were used to categorise the data, the categories were counted and the findings are expressed in terms of quantitative data. The SAG was analysed by using each sentence as a unit of analysis. The coding was carefully prepared on an excel spreadsheet.

There were three categories used to analyse the intended curriculum: propositional knowledge, practical knowledge and work process knowledge. This analysis was quantitative in that the number of sentences in each category was counted.

Sentences coded for the propositional knowledge category were identified by verbs like describe, explain, outline, recognise and similar. Here the student is required to understand why he is doing something. Sentences coded for the practical knowledge were verbs such as clean, store, test, carry out, operate, remove, replace, etc. The words used for practical knowledge were those that provoked an action.

Sentences coded for work process knowledge were identified by verbs like identify and explain, demonstrate, apply, identify and use, etc. In this category, both propositional and practical knowledge is required. Where students were requested to carry out two activities, for example ‘identify and explain’, was regarded as work process knowledge due to the point that the student required both propositional and practical knowledge in order to complete the task. The same would apply for verbs listed earlier in this section.

The following table describes the three types of knowledge and provides a description of each category and the way in which various authors identify the category:

Category of knowledge	Description	Indicators	Examples of outcomes
Propositional knowledge	Sometimes called codified knowledge that are stored in books and journals (Wilson & Demetriou, 2007) Sometimes referred to as propositional knowledge, knowledge that (Winch, 2012) Context-free, guiding action, academic (F. Rauner, 2007)	Where outcomes used verbs such as explain, outline, describe, and recognise which are mental rather than practical tasks.	Describe the reasons for using colour coding in an automotive workshop Explain the purpose of different safety signs Distinguish between an accident and an incident.
Practical knowledge	Referred to as the demonstrated ability to perform a set of tasks (Gamble, 2009a) Contextualised and implicit (F. Rauner, 2007)	Where outcomes used verbs like use, demonstrate, apply, select, carry out, operate, remove and replace, etc., which refer to practical rather than mental tasks.	Operate two post and four post hoists correctly and safely.
Work Process Knowledge	Work process knowledge can be characterised in an initial approximationas a combination of practical and theoretical knowledge (F. Rauner, 2007) Also is contextualised, guiding action and explicit (F. Rauner, 2007)	Where outcomes make it explicit that both propositional and practical knowledge is required e.g. Identify and correctly use	Identify and use special tools applicable to the automotive trade

TABLE 13: VARIOUS THEORISTS' PERSPECTIVES ON PRACTICAL KNOWLEDGE, THEORETICAL KNOWLEDGE AND WORK PROCESS KNOWLEDGE, WITH INDICATORS FOR ANALYSIS, AND EXAMPLES OF SENTENCES CODED IN THIS WAY.

4.4 FINDINGS OF THE SAG ANALYSIS

4.4.1 ANALYSIS OF THE LOS OF THE ASSESSMENT GUIDELINES NCV ARM LEVEL TWO

The following is taking a closer look at the analysis conducted on specific LOs and the extent to which the curriculum focuses on theoretical knowledge, practical knowledge and work process knowledge. Three categories were identified from the following analysis: *Category one*: this is the relationship where the theoretical knowledge dominates both the practical knowledge. *Category two*: is where the practical knowledge dominates the theoretical knowledge and *Category three*: the third and final category is that where there is a balance between the theoretical knowledge and the practical knowledge. The balance would be regarded as the work process knowledge where the students are required to integrate the theoretical knowledge gained and apply it in practice .

	Topic Number:	Topic:	Knowledge that dominated in topic
Topics as per the NCV SAG ARM Level two	Topic One	Health and Safety	Theoretical knowledge
	Topic Two	Tools Applicable to the Auto Trade	Work process knowledge
	Topic Three	Measuring Equipment	Theoretical knowledge
	Topic Four	Vehicle Lifting Equipment	Practical knowledge
	Topic Five	Fundamentals of Engine Technology	Theoretical knowledge
	Topic Six	Bearings	Theoretical knowledge
	Topic Seven	Batteries	Work process knowledge
	Topic Eight	Lubrication Systems	Theoretical knowledge
	Topic Nine	Wheels and Tyres	Theoretical knowledge
	Topic Ten	Cooling Systems	Theoretical knowledge
	Topic Eleven	Lights and Automotive Electrical Systems	Practical knowledge
	Topic Twelve	Servicing a Vehicle	Practical knowledge

TABLE 14: TOPICS THAT ARE FOUND IN THE NCV ARM SAG

The table above shows the topics that are covered in the NCV ARM Level two SAG and the knowledge that is gained thereof. The colour coding is constant throughout and assists to

identify the different types of knowledge identified in this study. Theoretical knowledge is identified by means of the colour yellow, practical knowledge is identified by the purple and work process knowledge is the red colour. This colour layout will continue into the graphs and tables as well. Refer to Appendix seven for examples.

4.4.2 THE ANALYSIS OF LOS WHERE THE THEORETICAL KNOWLEDGE DOMINATES THE PRACTICAL KNOWLEDGE

Category One: a relationship where the theoretical knowledge dominates the practical knowledge. Here it was identified in LOs One, Three, Five, Six, Eight, Nine and Ten that there was more theoretical knowledge found in the LOs compared to that of the practical knowledge. In some instances, for example Learning Outcome Eight, the theoretical knowledge was the only concept that existed, practical knowledge was *practically* non-existent.

Upon analysis of Topic one and the LOs (See Figure 4above), it was identified from the above pie graph that the theoretical knowledge did dominate the content of this topic. It was noted that eighty nine percent (89%) of this topic was that of a theoretical nature. Aspects such as distinguish between an accident and an incident, describe the advantages of good housekeeping in the workshop guided me in the direction of the point that these were examples of theoretical knowledge, taking into consideration the use of verbs such as distinguish, describe, explain, etc.

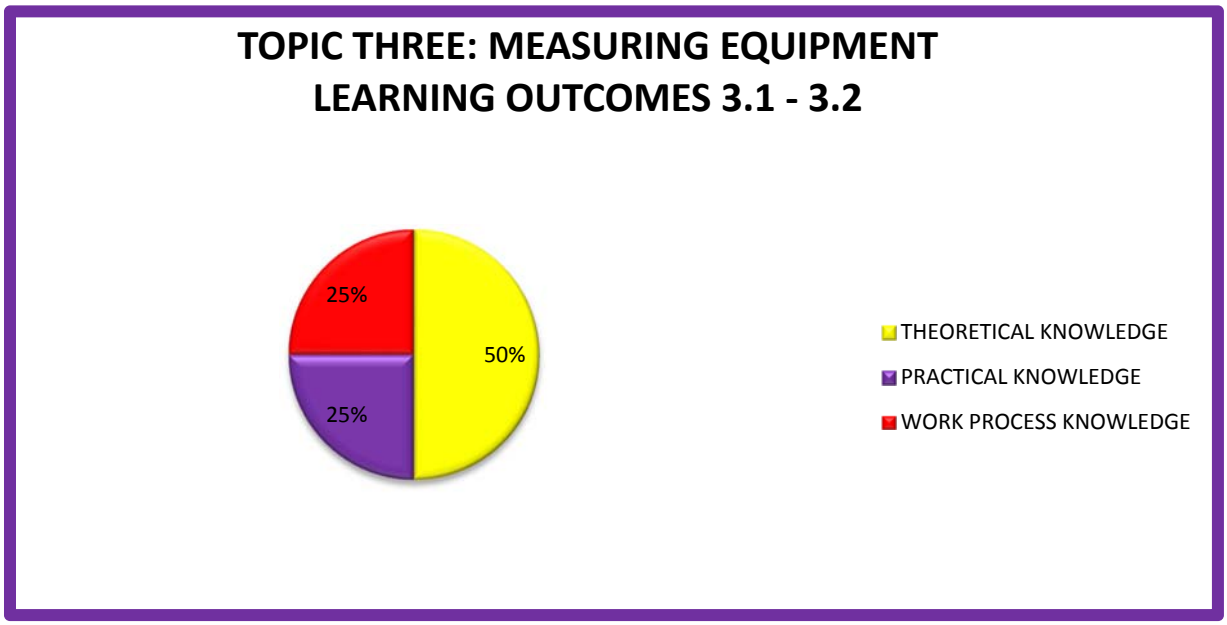


FIGURE 4: ANALYSIS OF TOPIC 3 (MEASURING EQUIPMENT) LOS 3.1 - 3.2 AS PER SAG NCV ARM

Topic three (see Figure 5), shows that there is again a domination of the theoretical knowledge where it is a fifty percent (50%) compared to the practical and work process knowledge which are equal at twenty five percent (25%) each. Topic three was similar to topic one where similar verbs were used which showed that the content was more of a theoretical nature rather than that of a practical or work process knowledge nature. Refer to Appendix eight for examples.

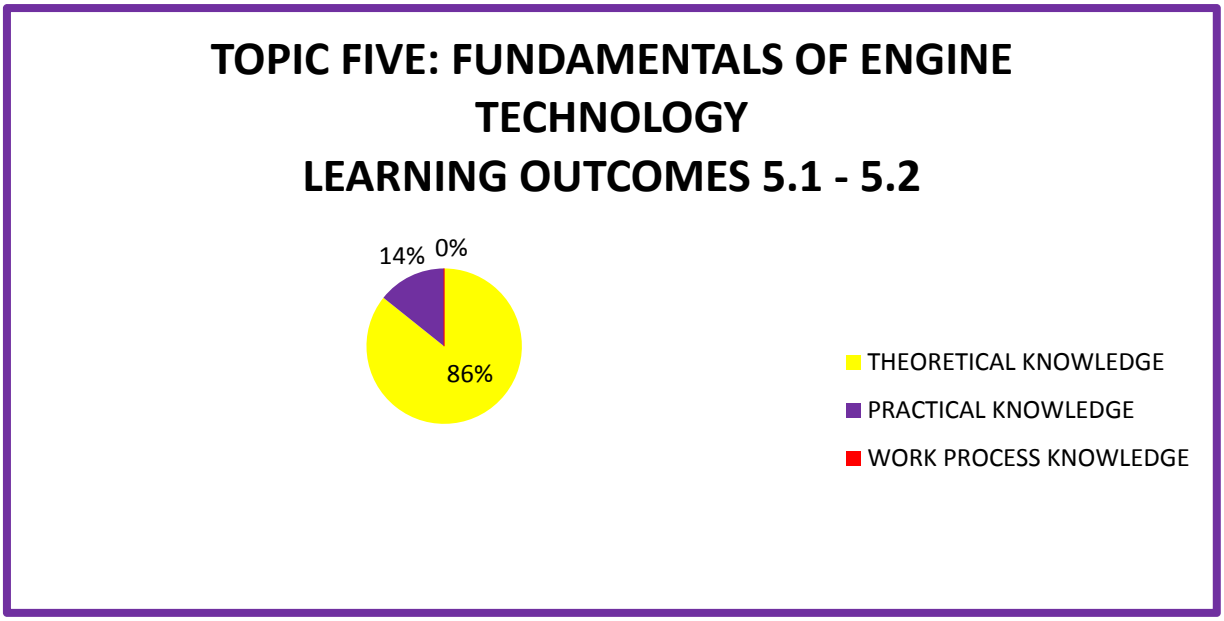


FIGURE 5: ANALYSIS OF TOPIC 5: (FUNDAMENTALS OF ENGINE TECHNOLOGY) LOS 5.1 - 5.2 AS PER SAG NCV ARM

Topic five, (Figure6), shows that theoretical knowledge dominates by eighty six percent (86%) in these LOs and practical knowledge is fourteen percent (14%) with work process knowledge at zero percent (0%). Refer to Appendix nine for examples.

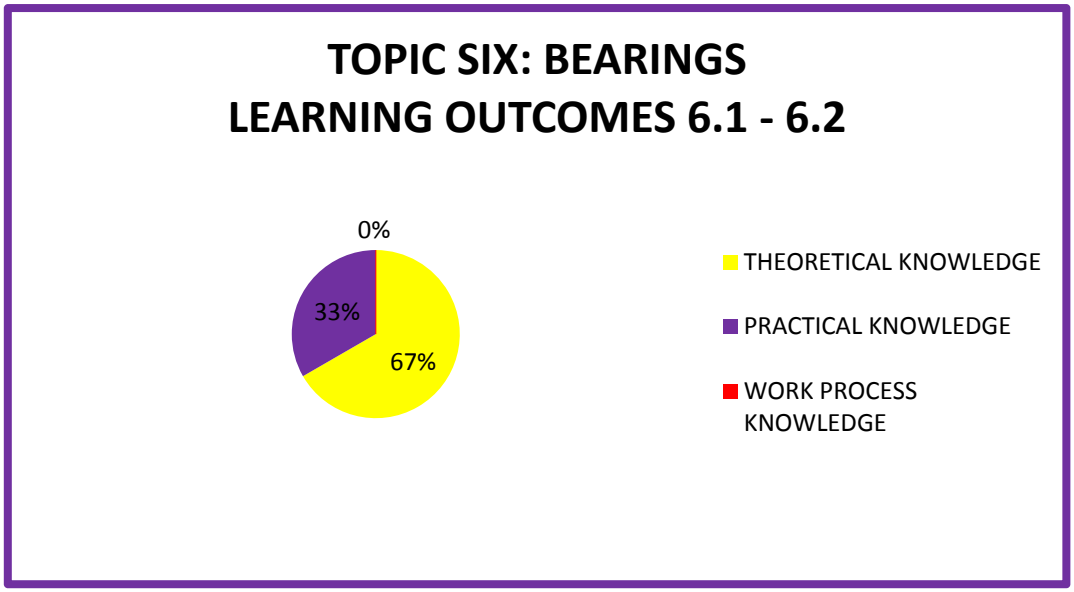


FIGURE 6: ANALYSIS OF TOPIC 6 (BEARINGS) LOS 6.1 - 6.2 AS PER SAG NCV ARM

The figure 7 above shows that theoretical knowledge once again dominates the practical knowledge which is thirty three percent (33%) and work process knowledge is zero percent (0%) compared to that of the theoretical knowledge which is a substantial sixty seven percent (67%). When analysing the LOs for topic six it once again reiterates verbs such as explain, describe, etc. Refer to Appendix ten for examples.

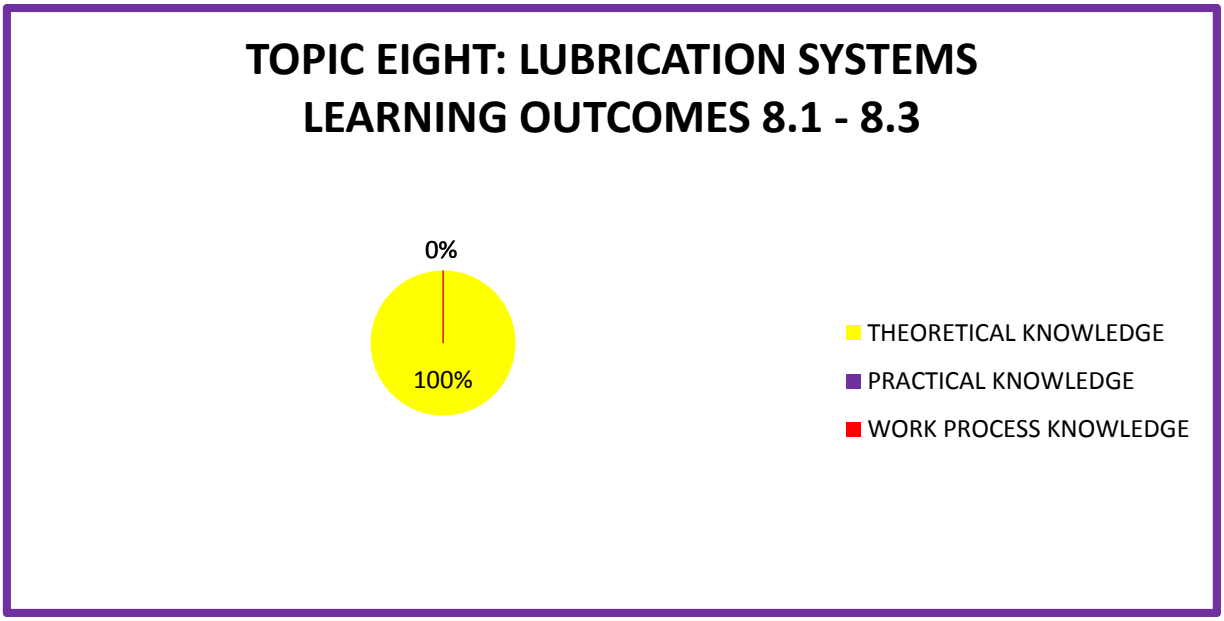


FIGURE 7: ANALYSIS OF TOPIC 8 (LUBRICATION SYSTEMS) LOS 8.1 - 8.3 AS PER SAG NCV ARM

Theoretical knowledge in Topic eight left no room for any practical or work process knowledge. Lubrication systems were content driven and LOs reinforced this by using verbs such as explain and identify. Theoretical knowledge was the unanimous denominator here with one hundred percent (100%) of the content. Refer to Appendix eleven for examples.

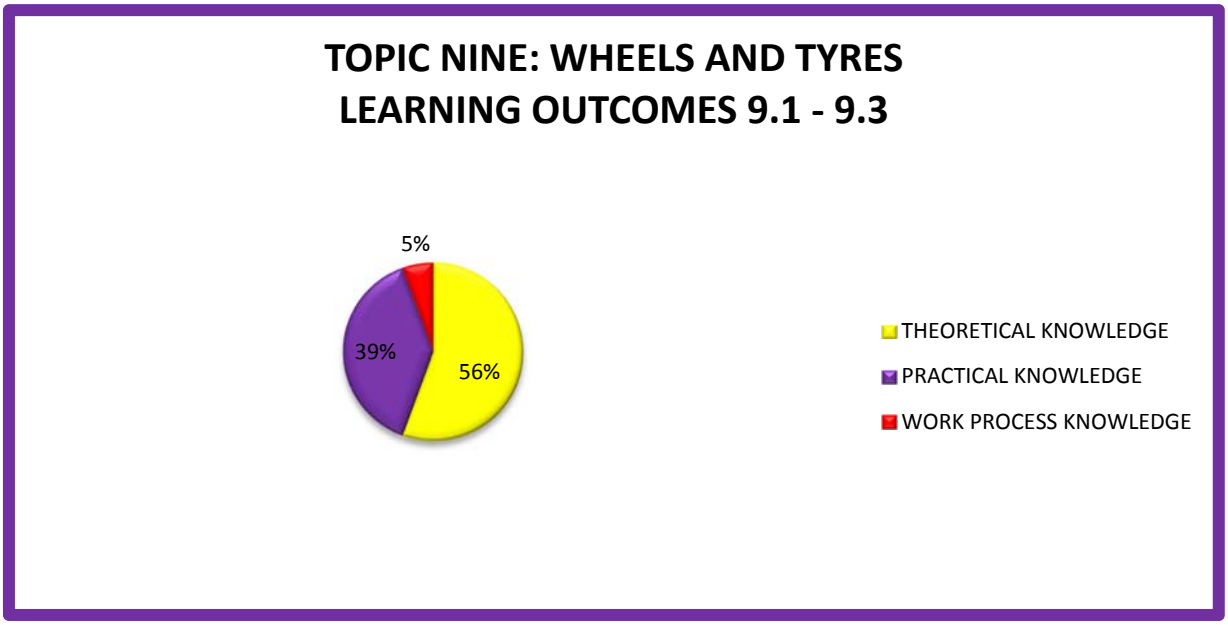


FIGURE 8: ANALYSIS OF TOPIC 9 (WHEELS AND TYRES) LOS 9.1 - 9.3 AS PER SAG NCV ARM

Topic nine, as per figure9, showed theoretical knowledge domination once again in these LOs, where fifty six percent (56%) of the content was theoretically aligned whereas thirty nine percent (39%) was practical knowledge and five percent (5%) was allocated to the work process knowledge aspect. Refer to Appendix twelve for examples.

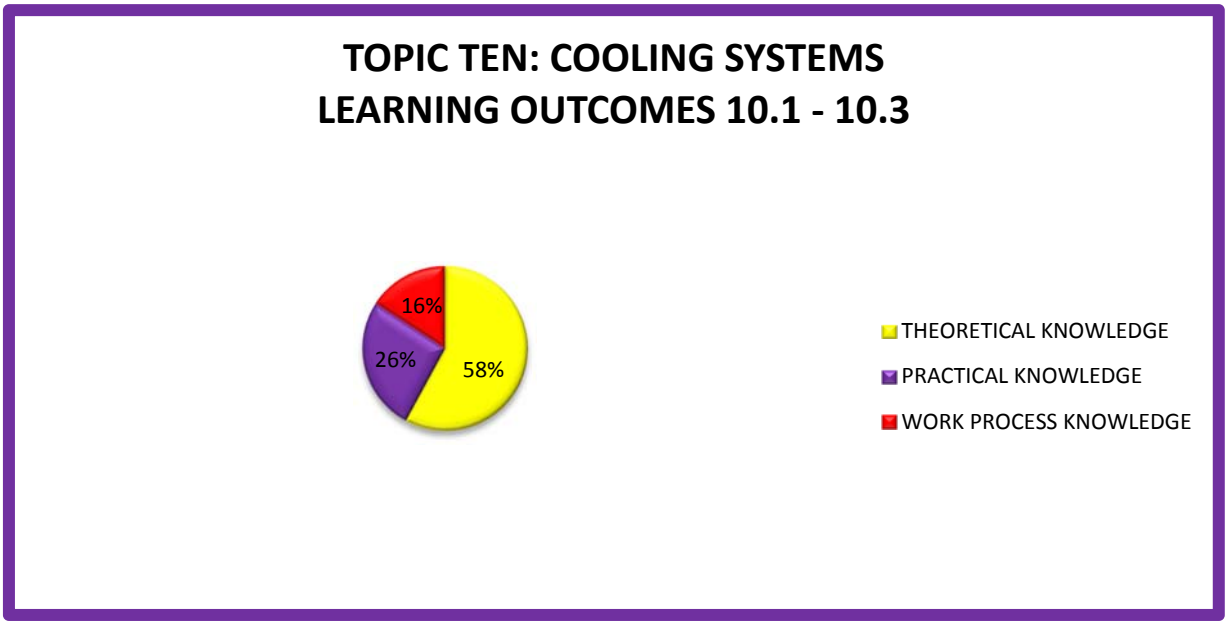


FIGURE 9: ANALYSIS OF TOPIC 10 (COOLING SYSTEMS) LOS 10.1 - 10.3 AS PER SAG NCV ARM

In the topic of Cooling Systems, the theoretical knowledge is more than double the practical knowledge and more than three times the work process knowledge. Once again theoretical knowledge is the dominating factor. Refer to Appendix thirteen for examples.

4.4.3 THE ANALYSIS OF LOS WHERE THE PRACTICAL KNOWLEDGE DOMINATES THE THEORETICAL KNOWLEDGE

The following figures show that practical knowledge dominates the theoretical knowledge in this relationship category. There are twelve LOs in the SAG ARM, and seven out of those twelve shows a domination of theoretical knowledge.

Category Two: this is a relationship where the practical knowledge dominates the theoretical knowledge. Here it was identified that only three of the twelve LOs were dominated by practical knowledge. The LOs were LO four, eleven and twelve. Theoretical knowledge was in present in this category but to a bare minimum.

LO four is related to the topic of Vehicle Lifting Equipment, LO eleven is related to Lights and Automotive Electrical Systems and LO twelve deals with Servicing a Vehicle. These LOs entail action the students have to physically carry out the task.

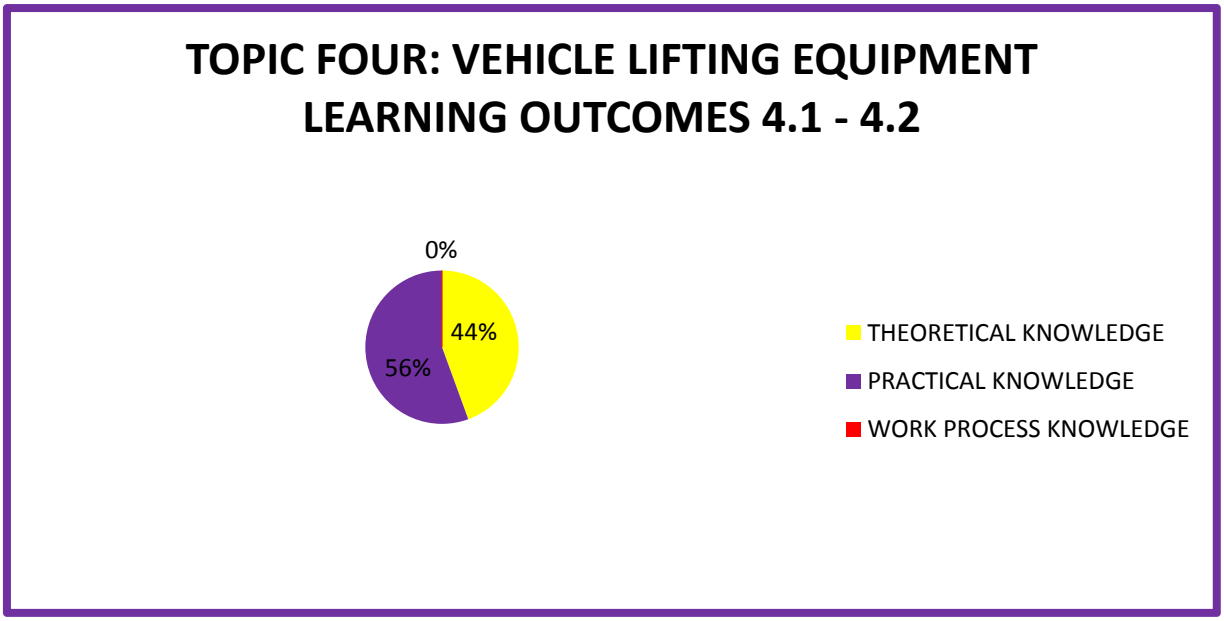


FIGURE 10: ANALYSIS OF TOPIC 4 (VEHICLE LIFTING EQUIPMENT) LOS 4.1 - 4.2 AS PER SAG NCV ARM

In this analysis there is a twelve percent (12%) difference between the practical knowledge and the theoretical knowledge, where the practical knowledge is fifty six percent (56%) and the theoretical knowledge follows with forty four percent (44%). Here verbs such as select, carry out, operate, etc. were used, and these words implied that a student should carry out a certain task or physically do something. Refer to Appendix fourteen for examples.

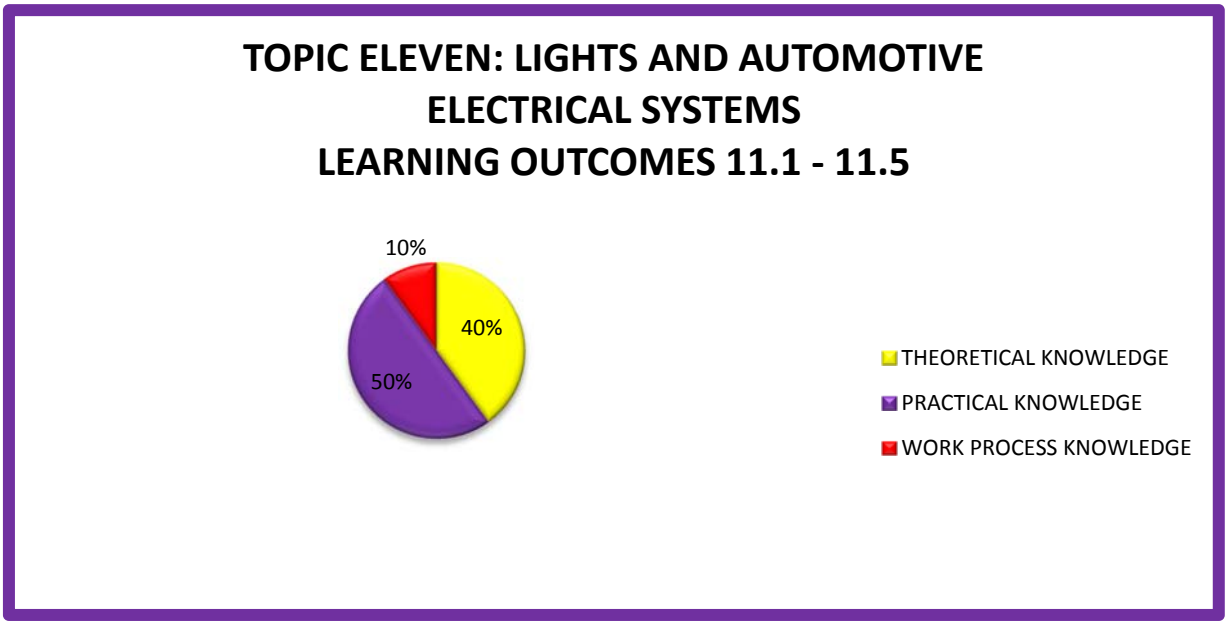


FIGURE 11: ANALYSIS OF TOPIC 11 (LIGHTS AND AUTOMOTIVE ELECTRICAL SYSTEMS) LOS 11.1 - 11.5 AS PER SAG NCV ARM

Here the difference is identified as a mere ten percent (10%) between the practical knowledge and the theoretical knowledge. Although the difference is so small, there is in fact still a difference which shows that more practical knowledge is gained rather than theoretical knowledge. In these LOs verbs such as prepare, align, adjust, etc. are used which showed me that these words implied practical knowledge being acquired. Refer to Appendix fifteen for examples.

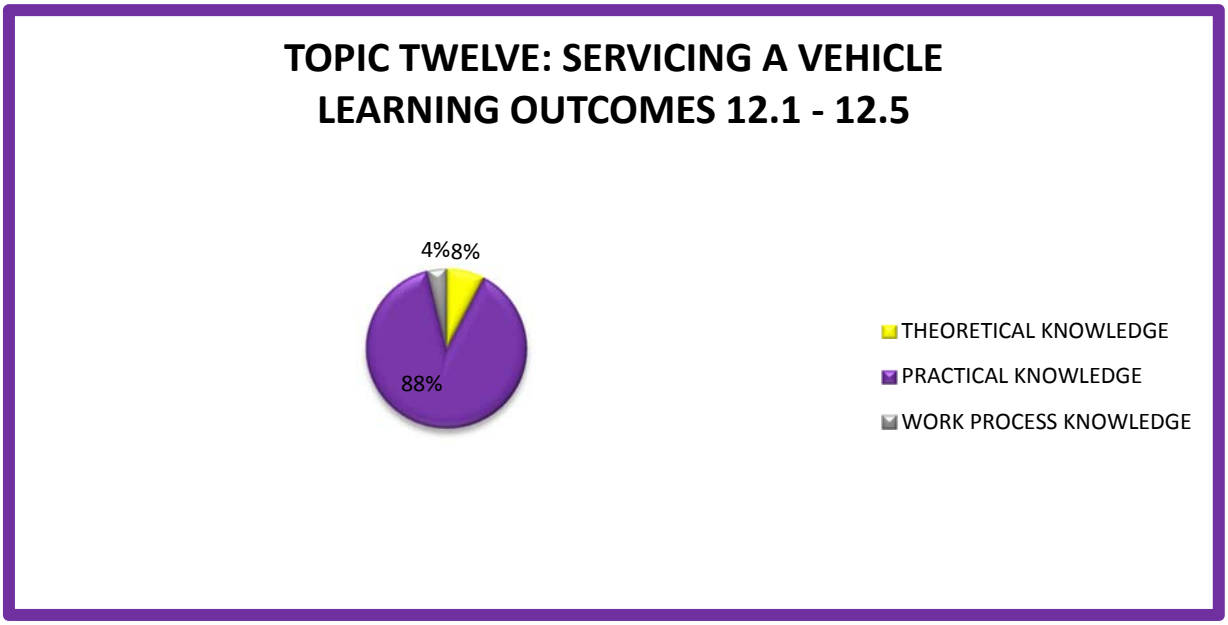


FIGURE 12: ANALYSIS OF TOPIC 12 (SERVICING A VEHICLE) LOS 12.1 - 12.5 AS PER SAG NCV ARM

Eighty eight percent (88%) of the LOs for the topic of Servicing a vehichle were coded as practical knowledge, which dominates work process knowledge and theoretical knowledge. Refer to Appendix sixteen for examples.

4.4.5 THE ANALYSIS OF LOS WHERE THERE IS A RELATIONSHIP BETWEEN PRACTICAL KNOWLEDGE AND THEORETICAL KNOWLEDGE

Category three: the third and final category is where there is a balance between the theoretical knowledge and the practical knowledge relationship exists. This category is referred to in Rauner (2007) as the Work Process Knowledge stage.

Work process knowledge is regarded as a central category of knowledge: it is knowledge which arises from reflective work experience and is incorporated in practical work. Work process knowledge is a form of knowledge that guides practical work and, as contextualised knowledge, goes far beyond non-contextual theoretical knowledge (F. Rauner, 2007).

This is a category where the practical knowledge explicitly relies on the propositional knowledge. Here it was identified in LOs Two and Seven that there was a relationship between theoretical knowledge and practical knowledge rather than a domination of one or the other.

The two figures presented below shows a relationship where the practical knowledge and theoretical knowledge are more or less equal. This should be the ideal relationship that should be expected to exist in a vocational training institution. The two representations below show LO Two which entails Tools Applicable to the Automotive Trade and LO Seven which involves Batteries.

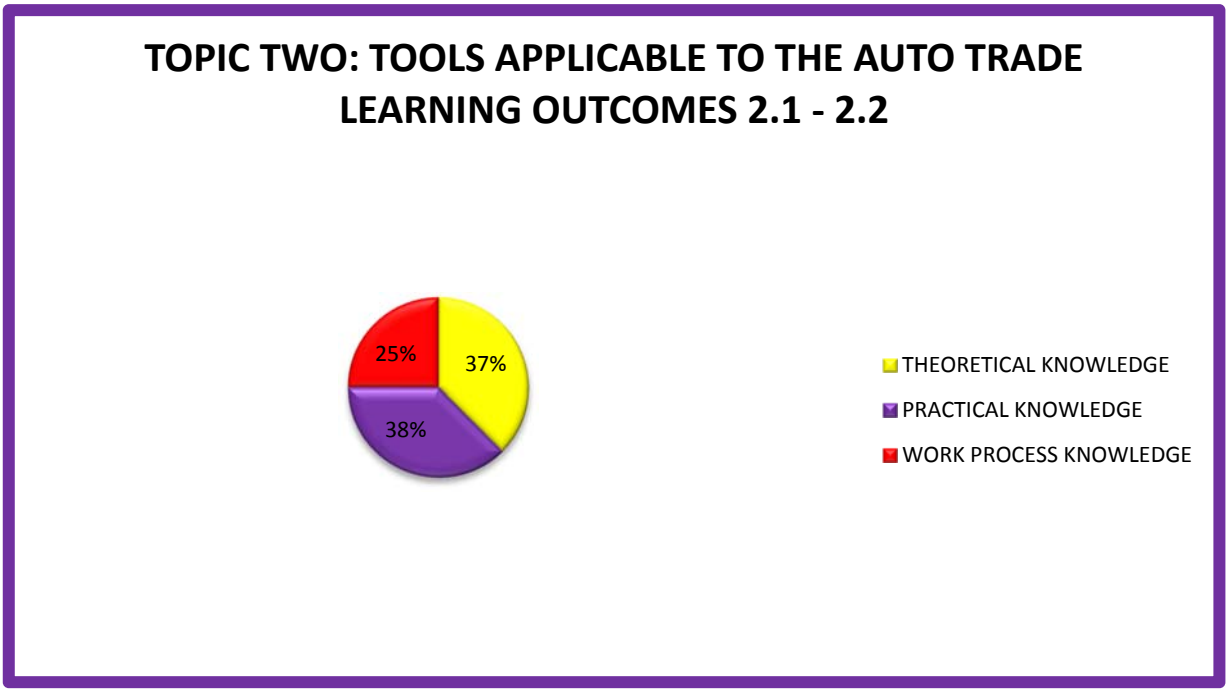


FIGURE 13: ANALYSIS OF TOPIC 2 (TOOLS APPLICABLE TO THE AUTO TRADE) LOS 2.1 - 2.2 AS PER SAG NCV ARM

In this case although work process knowledge does not dominate there is an insignificant difference of one percent (1%) between the practical knowledge and theoretical knowledge that occurs in topic two LOs. Here words such as 'identify and correctly use various workshop tools applicable to the automotive trade' where the propositional knowledge had to be known before carrying out the task on hand. The student had to be aware of the tools that are used in the automotive trade first and then secondly he would have to know how to use them correctly. Refer to Appendix seventeen for examples.

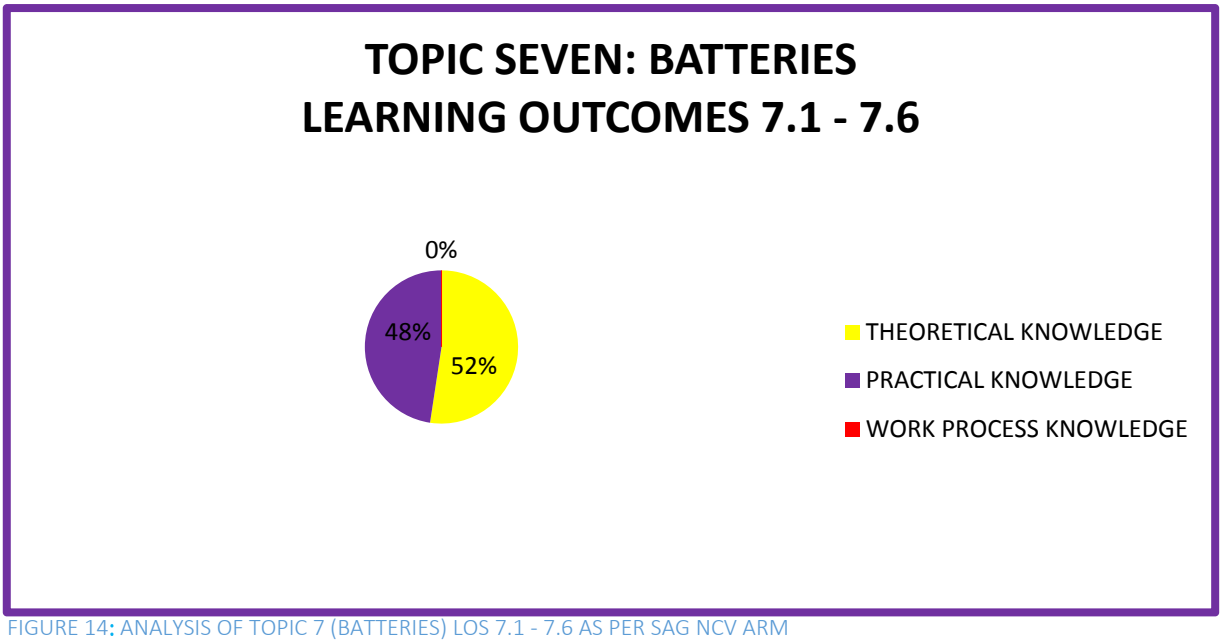


FIGURE 14: ANALYSIS OF TOPIC 7 (BATTERIES) LOS 7.1 - 7.6 AS PER SAG NCV ARM

Although the work process knowledge is equivalent to zero percent (0%), the difference between the practical knowledge and theoretical knowledge is an insignificant four percent (4%). The work process knowledge factor also arose here due to the descriptive words that were used, this was identified by, for example, *replace a vehicle battery according to manufacturer's specifications.* In order for the student to carry out this activity, the student must have underpinning knowledge of what are the manufacturer's specifications in order for him to carry out the task of replacing the battery. Refer to Appendix eighteen for examples.

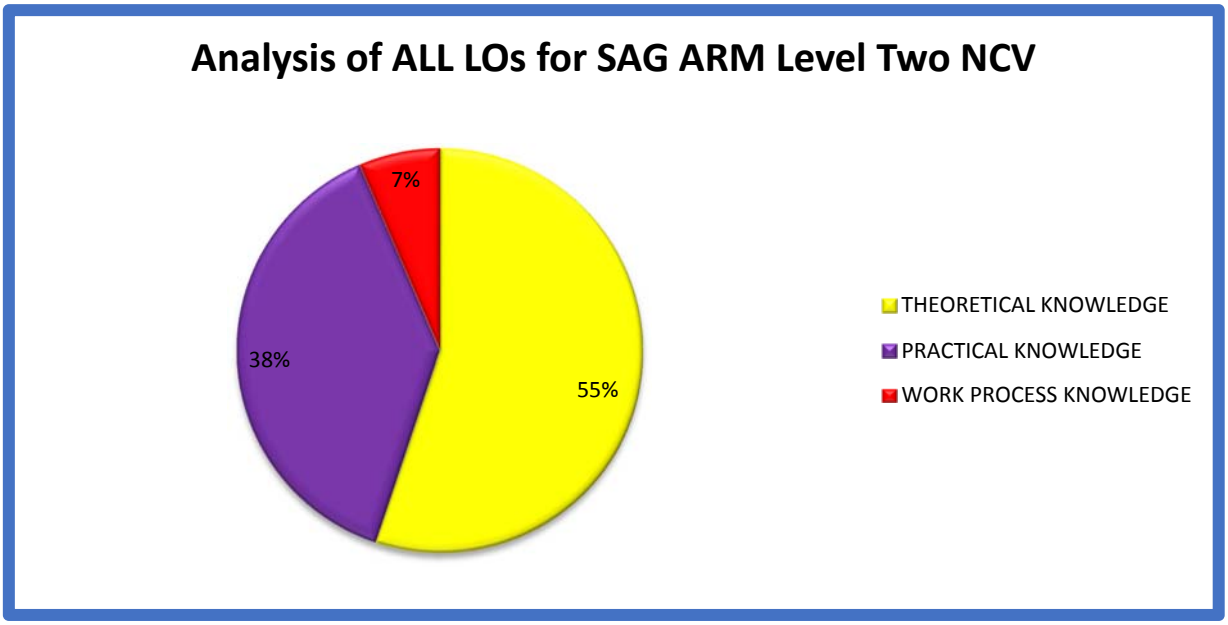


FIGURE 15: ANALYSIS OF ALL LOS THAT ARE CONTAINED IN THE SAG NCV ARM

By analysing all the topics and LOs together it is clear that theoretical knowledge dominates the syllabus. This should not be the case since NCV was introduced in order to make the program more practical and to allow for easier access into the workplace with the integration of the practical and theoretical knowledge. In this case seven out of the twelve topics were dominated by outcomes that focused on theoretical knowledge, three topics were dominated by outcomes that focused on practical knowledge and two had a possible relationship between the two, implying work process knowledge.

A table clearly explaining the above has been produced below which shows the total number of outcomes which reflect practical, theoretical and work process knowledge in the SAG.

ANALYSIS OF THE LOs OF THE SAG NCV ARM LEVEL TWO				
ASPECT	NUMBER OF THEORETICAL KNOWLEDGE OCCURRENCES	NUMBER OF PRACTICAL KNOWLEDGE OCCURRENCES	NUMBER OF WORK PROCESS KNOWLEDGE OCCURRENCES	TOTAL NUMBER OF OCCURRENCES PER LOs
LEARNING OUTCOME 1.1 - 1.6	17 / 89%	2 / 11%	0 / 0%	19 / 10%
LEARNING OUTCOME 2.1 - 2.2	3 / 37.5%	3 / 37.5%	2 / 25%	8 / 4%
LEARNING OUTCOME 3.1 - 3.2	6 / 50%	3 / 25%	3 / 25%	12 / 6%
LEARNING OUTCOME 4.1 - 4.2	4 / 44.5%	5 / 55.5%	0 / 0%	9 / 5%
LEARNING OUTCOME 5.1 - 5.2	6 / 86%	1 / 14%	0 / 0%	7 / 4%
LEARNING OUTCOME 6.1 - 6.2	4 / 67%	2 / 33%	0 / 0%	6 / 4%
LEARNING OUTCOME 7.1 - 7.6	11 / 52%	10 / 48%	0 / 0%	21 / 11%
LEARNING OUTCOME 8.1 - 8.3	20 / 100%	0 / 0%	0 / 0%	20 / 11%
LEARNING OUTCOME 9.1 - 9.3	10 / 56%	7 / 38%	1 / 6%	18 / 10%
LEARNING OUTCOME 10.1 - 10.3	11 / 58%	5 / 26%	3 / 16%	19 / 10%
LEARNING OUTCOME 11.1 - 11.5	8 / 40%	10 / 50%	2 / 10%	20 / 11%
LEARNING OUTCOME 12.1 - 12.5	2 / 8%	23 / 88%	1 / 4%	26 / 14%
TOTAL NUMBER OF OCCURRENCES of Los	102 / 55%	71 / 38%	12 / 7%	Grand total: 185 /100%

TABLE 15: ANALYSIS OF ALL LOS AS PER SAG NCV ARM

4.5 DISCUSSION OF THE ANALYSIS OF THE LOS OF THE SAG NCV ARM LEVEL TWO

When the LOs of the NCV SAG were analyzed the following question was taken into account what is the extent that the learning outcomes require propositional knowledge and practical knowledge in the NCV for the ARM Curriculum i.e. the SAG for ARM Level two?

It was identified that there were twelve topics contained in the SAG. Those topics were broken down into SOs, LOs and AS. This analysis focused on the LOs and the relationship between propositional / theoretical knowledge and practical knowledge.

The LOs were analysed according to three categories: Propositional knowledge, Practical knowledge and Work Process Knowledge. The analysis showed that seven of the twelve topics were dominated by Propositional Knowledge, three of the twelve topics were dominated by Practical knowledge and just two of the topics from the twelve topics were Work Process Knowledge.

The topics with learning outcomes that were dominated by theoretical knowledge were as follows: Topic One: Health and Safety, Topic Three: Measuring Equipment, Topic Five: Fundamentals of Engine Technology, Topic Six: Bearings, Topic Eight: Lubrication Systems, Topic Nine: Wheels and Tyres and Topic Ten: Cooling Systems. Theoretical knowledge was identified by words such as *describe, explain, outline, etc.*

The topics with learning outcomes that were dominated by practical knowledge were as follows: Topic Four: Vehicle Lifting Equipment, Topic Eleven: Lights and Auto Electrical Systems and Topic Twelve: Servicing a Vehicle. Practical knowledge was identified by words such as *clean, test, store, carry out, etc.*

The topics with learning outcomes that were dominated by Work Process Knowledge were as follows: Topic Two: Tools Applicable to Automotive Trade and Topic Seven: Batteries. Work Process Knowledge was identified by words such as *apply, demonstrate, identify and use, etc*.

> It has been suggested that most learning programmes do provide learners with propositional knowledge or foundational competence. However, within the context of applied competence, they should also offer learners opportunities to gain practical competence, not only in controlled and defined environments ... but also outside the safety of the classroom and laboratory, in real world contexts, where learners will be required to adapt and re-contextualise their learning to function successfully in complex and unpredictable circumstances (SAQA, 2000, pp. 17 - 18).

According to Young (2008, p. 173) the vocational curriculum needed to be controlled by key stakeholders i.e. employers and not the training centres (the TVET colleges). The previous SAG that existed in the NCV was based on bodies of knowledge. This outdated SAG needed to be revised and updated to keep up with industry. It was perceived as stressing what students needed to know (theoretical knowledge) and not paying enough attention to what they would need to do when they were at work (work process knowledge).

Although the curriculum has been revised and the new SAG for Level two was implemented in 2013, the analysis provided above shows that the theoretical knowledge dominates the practical knowledge by seventeen percent. The work process knowledge concept is unfortunately few and far between, making up a mere seven percent of the LOs.

The above figure shows that the relationship between theoretical knowledge and practical knowledge is one that needs to be worked further on to enhance the program in becoming more practically aligned. To reiterate this:

> The NCV at Level two on the national qualifications framework (NQF) will provide learning experiences in situations contextually relevant to the particular vocational area in which the programme is situated. The NCV at Level two on the NQF will offer programs that will consist of the academic and theoretical knowledge integrated with the practical skills / knowledge and values specific to each vocational area (Department of Education, 2006, p. 12).

4.6 CONCLUSION

In conclusion, this chapter outlined the different levels of curriculum that exist within the NCV ARM, which then led to a discussion of the intended curriculum and the structure of the curriculum. The next section went on to discuss the methodology employed to analyse the SAG and the process thereof with a presentation of the data that followed. Lastly a discussion of the analysis was done and the findings were made explicit that although the NCV was implemented to introduce a more practical program this indeed is not the case. From the findings generated about it is clear that theoretical knowledge is still the clear dominator of the SAG.

CHAPTER FIVE

THE ENACTED ARM CURRICULUM

5.1 INTRODUCTION

In this chapter, the following question is addressed: what is the emphasis on propositional and practical knowledge in the teaching of the NCV ARM module; i.e. the enacted curriculum?

The above research question is addressed in this chapter with data collected from two data collection methods. One method is that of the observation that took place during the NCV ARM lecture and on the second method is the semi-structured interview which was conducted with the NCV ARM lecturer at Campus X.

The chapter presents a description and analysis of the lesson observation. The semi-structured interview data is integrated into the interpretive discussion of this chapter. The chapter is rounded up with a conclusion.

5.2 TWO METHODS EMPLOYED WHEN ANALYSING THE ENACTED CURRICULUM

5.2.1 METHOD ONE: SEMI-STRUCTURED INTERVIEW

The purpose of the interview was first and foremost a means of gathering data which will have assumedly have direct impact on the research questions that are asked regarding this particular research, as Tuckman (2012) described. A semi-structured interview was conducted with the ARM lecturer at Campus X. This was chosen because it allows the researcher to ask more open-ended questions compared to that of a structured interview..

5.2.2 METHOD TWO: OBSERVATION OF THE NCV ARM LECTURE

There is no better way for me to find out about the way in which a task is carried out than to follow their supervisor or mentor, in their shadow, this will assist immensely in finding out the way the lecturer carries out his daily routine. This is referred to as *field research*.

> Field research contains a tremendously methodical and demanding study of everyday life ... to maximise researchers' consideration of some social occurrence, they will enthusiastically pursue communication with particular individuals or in specific areas and they will deliberately vary the times and days of their field involvements. Their comments will be steered in the interest of responding specific research queries. Field researchers are also dedicated to a full documentation of their observation by recording complete field notes (Ruane, 2008, p. 164).

The research carried out here was done by means of unstructured observation, whereby I did not make use of checklists or any rating scores. The observation carried out was an unrestricted description of what was observed during the lessons. Although I did not fill out a checklist with particular categories this did not mean that all that was seen could be captured.

The observation was selective; where I focused on certain events that happened during the lesson, particularly on the focus of theory and practice. The data was analysed and interpreted according to my theoretical lens, which in this case was extent to which the lesson focused on practical and propositional knowledge.

The NCV ARM classroom observation was carried out over five days, for a double lesson in the NCV ARM Level two classes, which is one hour five minutes per lesson. Therefore, each observation that was carried out lasted approximately two hours and ten minutes each. Each lesson, as per college timetable, starts at 7:45am and ends at 09:55am. There were no lessons that were carried out for the full duration of the expected timetable lecture during the observation; this was due to many barriers beyond the students and lecturer's control. These factors are discussed in more detail within the chapter.

5.2.2.1 The NCV ARM Lecturer

Prior to being employed by the TVET College, the lecturer worked at KwaZulu Transport for approximately five years as a training officer. He then moved on to McCarthy Rodway, *"I think it was called in those days*", which was in the automotive workshop as a motor mechanic on the workshop floor.

The lecturer was first employed in 1986 at Campus D. He moved to Campus X in 2001. He has been employed by the college from 1986 – to date. The lecturer has been in the lecturing at the TVET College for the last 28 years. He started off teaching NATED (Mechanical) at Campus X in the engineering division and moved to NCV ARM in 2008 when the campus began specialising in NCV. He was then deployed to the ARM workshop in NCV due to his vast experience in the field.

5.3 FIVE DAYS OF NON-PARTICIPANT OBSERVATION IN THE NCV ARM CLASSROOM

This next section was an analysis of the observation that was conducted. This was broken up into five days. Each day is described below in detail. The section starts with a plan of the NCV ARM workshop / classroom.

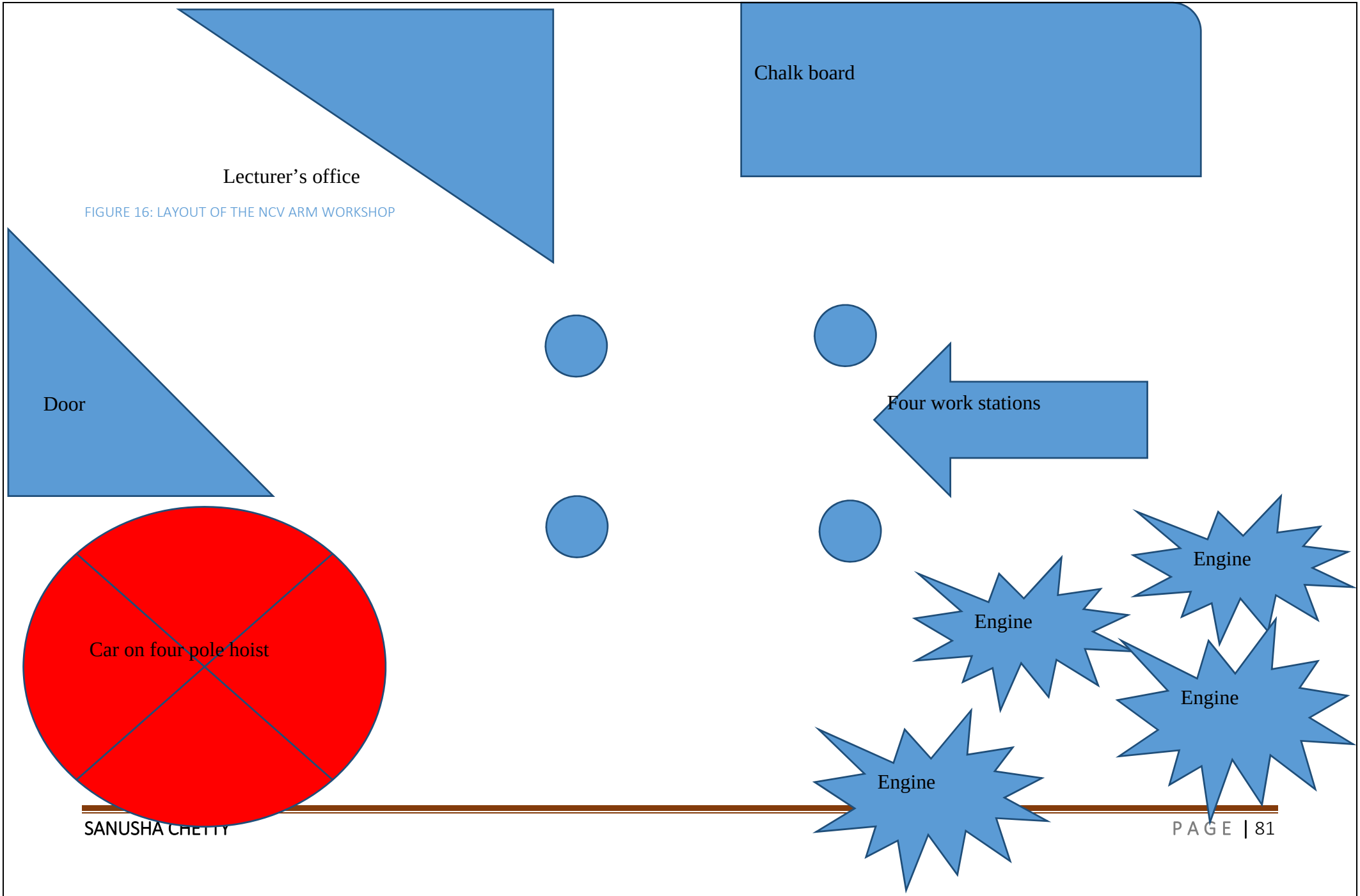


FIGURE 16: LAYOUT OF THE NCV ARM WORKSHOP

5.3.1 DAY ONE (TABLE 21: SUMMARY OF DAY ONE)

The lesson was based on *functions of motor vehicle engine parts and components.* The lecturer discussed seven main components; radiator, starter motor, ignition system, battery, overflow hose flywheel, inlet and outlet valves, air filter and the piston. He explained each component for approximately six minutes; this included a description of the component, the function and where it may be located in and around the engine.

The lecturer used only one method of teaching here. This same process, not necessarily in that order, was used to teach all seven components mentioned above, whereby the lecturer would read about the component from the textbook, show the students the part on the fixed engine and then ask the students for the function of the component.

During the class the students had their textbooks in their hands, as they stood in the workshop rather than sitting in a classroom at a desk. The students walked around with the lecturer as he showed them the seven components mentioned above and also showed them where the components are located on the fixed engine in the workshop. There was lots of time lost during the class due to the shuffling to and from the components thereby increasing the amount of chatter that took place amongst the students.

FIGURE 17: STUDENTS STAND IN THE WORKSHOP WITH THEIR TEXTBOOKS AS COMPARED TO IF THEY WERE IN A CLASSROOM SEATED

The lecture started at 08:15am due to the students coming in late. This happens in many instances since many of the students come from far; some students even walk 10kms or more every day to the college. Many students cannot afford to pay the taxi fare, so this is taken into consideration by the lecturers. Students do put in an effort to arrive on time and in most instances do arrive on time; however there are times when students cannot control the barriers that may exist. Finally, at 08:20am the lecturer called the names from the register to check who was present for the lesson.

The lecturer started at about 08:25am by reading a section from the textbook about radiators:

Lecturer: "Today's lecture will be based on the engines components and parts. We will discuss the different components that exist in the engine; I will show you where they are located on the engine and then we will go on to discuss the functions of those parts. The first part that will be discussed is that of the radiator." (The lecturer reads from page 74 of the textbook) "The radiator is situated in the front of the engine compartment, just behind the

grill, where it is exposed to the maximum of cooling air." He then turns to the students and asks, "Why is the radiator at the front of the engine compartment and not toward the back?"

Student One: "I don't know, sir."

Student Two: "To ensure that the radiator cools."

The lecturer does not respond to the student, he merely continues with the lesson. The lecturer then directs the students to fixed engine that he has in the workshop and points out the radiator to them.

FIGURE 18: THE FIXED ENGINE PLACED IN THE ARM WORKSHOP

The lecturer walks toward the fixed engine that is available in the workshop, to show the students the radiator and where it is located. The lecturer points to the radiator and repeats what he had read in the textbook. He shows the students the different components of the radiators and repeats the question, however this time it is phrased differently:

Lecturer: "What is the function of the radiator?"

There was lots of mumbling and chattering from the students, trying to figure out what the answer to the question was. (An interesting point here was that when the question is asked

differently about half the students present were unable to realise that although the lecturer asked two questions, the question was the same.)

Student 1: “I don’t know.”

Student 2: “The radiator assists in cooling down the engine.”

Lecturer: “Let’s move on to the next component.”

A point to take note of here is that the lecturer does not agree or disagree with the students regarding their answer, he simply moves on to the next component. This leaves students in limbo since they are still uncertain of the correct or incorrect answer.

This point was reiterated during the focus group discussion with group one, where although the students are not seated formally in the workshop with a desk to write on, they are quite pleased with the knowledge that they gain. Student Two in the focus group stated that *“although the lecturer reads from the textbook he also shows us the components, once the part is seen it is easier to remember. The test was easy to learn for because when reading from the textbook we could “see” what we were reading and then what was said in the class was remembered.”*

This implies that a student does not have to be seated at a desk in order to gain valuable information, the workshop situation as in the NCV ARM classroom works just as well, for the students to gain the necessary information. This process seems to work better according to the students from the data gained from the focus groups.

It is important to note that during this lesson students would not be able to decipher legitimate text due to the point that the lecturer does not clarify information that is correct or incorrect.

The lecturer then moved on to the next component which was that of the starter motor. The lecturer read from textbook once again and then moved on to bring a starter motor to show to the students. He then realised that the starter motor was fixed onto the engine so the students were called toward him. While showing the students the starter motor, the students tend to lose focus and start chatting amongst themselves about what they think the component is and what the function of the starter motor is.

Lecturer: “What is the function of the starter motor?”

Students: Mumbling amongst themselves. No answer given

(The lecturer listened for a while to the whispers and mumbling)

Lecturer: “The starter motor’s function is to start the engine”

The lecturer then returned to the textbook for the next component, which was the ignition system. He then moved back to the engine, again to show the students where it was located on the fixed engine that was available in the workshop. Once again students followed him to the fixed engine. A point to take note of is that the engine was a standalone component and not one that was in a car. The lecturer explained and demonstrated where the key goes in order to start the car and spoke about the coil and the distributor. He explained that all these parts belong to the ignition system.

The coil was shown to the students and the lecturer once again asked what the purpose of the coil was. Student one responded; *“the coil was there to charge the battery”*, the answer was incorrect and the question was repeated by the lecturer, once again it is important to take note that the lecturer did not make the student aware of whether the answer was correct or not. This is negative for the student since he would not be able to identify what is correct or incorrect in the future.

Another student attempted to answer the question and spoke of the ignition, the lecturer made a little joke about it but the student still continued to answer. The answer again was incorrect but the student was not made aware of this. The lecturer then explained that *“the coil was there to convert 12 volts from the battery to 20000 volts in the battery and this charged the battery.”* Although student one answered correctly he did not explain fully and this is probably the reason why the lecturer ignored his answer. The lecturer explained *“a battery is 12 volts initially and the function of the coil is to convert the 12 volts to 20000 volts in order for the car to ‘run’/move from point A to point B.”*

The next component that the lecturer discussed was that of the distributor, the question was asked by the lecturer as to *“what is the function of this component.”* The lecturer showed the

students a distributor and demonstrated the way in which it worked. The lecturer then repeated the question of *"what is the function of the distributor"*; however he did not wait for a response and simply explained that *"the coil releases the 20000 volts to the distributor."* This was not a clear answer for the students and many students stood around thinking about what was said, however not a single student questioned the lecturer.

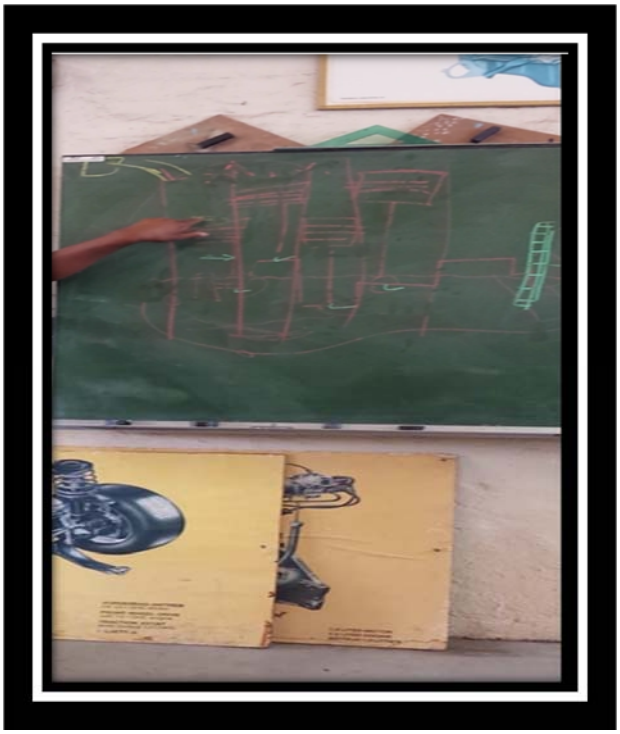


FIGURE 19: GRAPHIC ILLUSTRATION OF THE LECTURER EXPLAINING THE DISTRIBUTOR CONCEPT ON THE BOARD

The lecturer noticed many confused faces so he returned to the chalkboard to explain certain concepts. Students took their time to settle down, they continued chatting, some chatted about personal aspects and others discussed concepts that they were being taught. The students remained standing while the lecturer looked for his chalk; he left the board due to not being able to find his chalk and returned to the textbook where he began to read once again. The students didn't seem to pay attention as they continued to converse and moved around restlessly and looked quite tired of walking around the workshop sometimes quite aimlessly.

The actual lecture went on for about an hour. This time the lecturer read from the textbook about the next component which was the battery. The lecturer walked slowly to the battery

section of the workshop and students followed. (The walking process took up much time during the lesson). The lecturer questioned the students regarding the use of the battery. The lecturer code switches (codeswitching refers to using English and the students' mother tongue, which is isiZulu, to explain concepts) at many instances during the lesson, however whatever is said in isiZulu is repeated in English due to the fact that there are English speaking students in the class. Student one responded that *"it generates electricity"* (this would be viewed as one of the correct answers due to the fact that students from Campus X are from the rural area so a battery has many uses for them, electricity being one of them.) The question was then repeated by the lecturer, unfortunately the answer given by student one was not even acknowledged.

The lecturer paused and waited for a response from students, however the students looked around and chatted to each other but there were no correct answers given to the lecturer. The lecturer finally responded that it provides 12 volts into the engine.

The lecturer then moved toward the textbook to check the next component that would be discussed while students remained at the battery talking. They eventually followed sluggishly back to the fixed engine.

The lecturer held up a component and asked the students what they thought the part was. He then passed the part around for students to hold, feel and look at. He perused his textbook while the component was being passed around and then asked:

Lecturer: "Now that you have held and felt the part, can you name the part? If you cannot name the part, do you know the function of this part?"

Student: "It is the flywheel" and continues to respond by saying, "the function was to increase and decrease speed."

(The students wait patiently to hear what the lecturer says)

Lecturer: "It is there to control the speed of the vehicle"

Once again the lecturer does not confirm or reject the student's answer and leaves the students to guess what is correct and incorrect.

Students still seemed to be baffled by that component and did not seem to understand the function or where the component fits into the engine. No clear explanation was given to the students.

The lecturer then returned to the textbook he read:

Lecturer: “Identify the location and the function of the engine parts.”

He then returned to the fixed engine in the workshop and explained that the focus here was the radiator.

Lecturer: “Why is the radiator positioned at the front of the engine?”

Lecturer and students respond at the same time: “The radiator was there to cool down the engine.”

Lecturer: “Why was the radiator positioned at the front of the engine?”

Student one: *“Easier to fix”* (incorrect answer, but the student was not told this)

The lecturer walked away to find his chalk and then called the students to the board.

Lecturer: “The radiator is positioned so that it is against driving force so this made it easier for the radiator to cool the car down.”

(The lecturer drew an illustration on the board; he discussed the concept twice so that the students understood what was being explained)

While walking back to his textbook he explained one more time about the radiator. The next question he asked was, *“what is the purpose of the fan in the radiator?”* A student responded by saying that it is part of the radiator and helps to cool down the engine. (Once again no response from the lecturer) The lecturer then asked, *“What causes the engine to overheat?”* A discussion began between the lecturer and the students and the lecturer then turned to a particular student and asked *“what will happen when the engine overheats?”* The student responded by saying that *“if the engine overheats then the head gasket will blow.”*

Once again the lecturer does not acknowledge the students response, he then took his textbook and headed over to the motor vehicle that he has in the workshop. (The vehicle in the workshop is not a functioning vehicle). He opened up the bonnet and asked the students to look inside and locate the reservoir tank. Students pointed into the engine but could not locate it; eventually the lecturer showed the students where the water reservoir / tank were located.

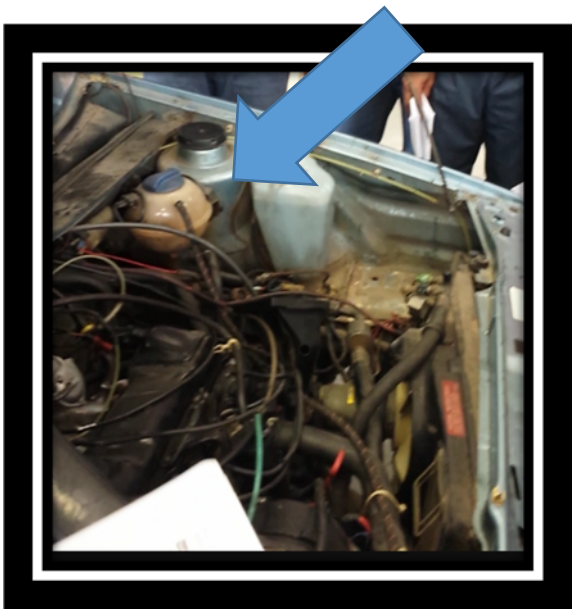


FIGURE 20: THE LECTURER SHOWS THE STUDENTS WHERE THE WATER RESERVOIR IS LOCATED

The next component that was discussed was that of the radiator cap, the students and lecturer moved quickly to the fixed engine where the students identified the radiator cap correctly. The students were then asked to identify the upper tank of the radiator. They did so confidently. The next component that they identified was the upper hose.

Lecturer: “What is the use of the upper hose? Is it an inlet or outlet pipe?”

(The lecturer did not wait for the students to respond)

Lecturer: “It is an inlet pipe; cool air comes from the radiator toward the engine to cool it down.”

Lecturer showed the students the fixed engine and referred them to the lower hose. He then asked them to locate the drain plug and realized that it was not on the fixed engine so they moved toward the vehicle. He searched the engine first; the students joined him and searched with him. The lecturer then stated that the vehicle was too old and it did not have a drain plug.

He then referred to the textbook but a student asked; *"If there was no drain plug, how do you drain the water?"* The lecturer responded by saying that you would remove the lower pipe and drain out the water. The next component that was questioned by the lecturer was that of the radiator core. Lecturer and students moved back toward the fixed engine to locate the radiator core. The radiator core looked similar to a grid. In this case the lecturer seemed to have switched from identifying and giving the function of the components to just identifying the components.

The next component was the overflow hose, students were asked to locate the overflow hose on the fixed engine and then asked by the lecturer, "*What's the function of the overflow hose?"* Students tried to answer the questions but with no luck. The lecturer responded; "*It is there to release pressure when the water temperature in the engine increased."*

He reverted to the textbook and returned to the starter motor which he started with at the beginning of the lecture. The starter motor was found at the side of the engine block which the lecturer pointed out to them. The lecturer said that the car cannot start without the starter motor.

The lecturer asked, "Is it possible to kick start a car without a starter motor?"A student responded, "Yes, because when you kick start a car you don't swing the ignition but rather you engage the gears so the car will start." The lecturer confirmed this answer. A student queried; "What was the purpose of turning the key when kick starting a vehicle?" The lecturer responded by saying "The reason you turn the key is to allow the coil to convert the voltage and this in turn will create a 'spark' in order to assist the vehicle to start."

The lecturer referred to the textbook asking if the students knew what a fly wheel was. He read from the textbook *"a starter is situated on the side of the engine block where the flywheel was located."* He then asked the students the question again… *"Where is the flywheel situated?"* He gave them time to look at the fixed engine again and then the lecturer laughed

and said *"You can't see the flywheel."* He walked toward the work table where he had an example of a flywheel to show to the students. He picked up the component and said *"This is a flywheel."* He passed the flywheel around for the students to touch and look carefully at. The girls said it's very heavy. The boys joked and said that the girls were very weak.

FIGURE 21: THE LECTURER SHOWS THE STUDENTS AN EXAMPLE OF A FLYWHEEL

The lecturer showed the students the gears on the flywheel, he then moved toward the chalkboard to draw a crankshaft. The lecturer then brought an example of the crankshaft to show to the students. He placed it on the work table and went to the fixed engine where he reminds them where the starter (*also tells them that when you 'swing' the starter will engage*) and flywheel is; he also reminds them of the gears on the flywheel. He went on to show them where the crankshaft was located and how it connects to the flywheel and starter. He has a handle which gives him the ability to turn the crankshaft which engages the starter which in turn rotates the flywheel. He turned the crankshaft many times to ensure the students notice how each part was connected to the other. He also mentioned that by turning the crankshaft it allows the pistons to move up and down, he returned to the drawing he made of the pistons on the chalkboard to show them the up and down action of the piston and then went to the board where he had pistons hanging from, to show them what they look like and how they moved.

The lecturer and the students moved back to the workspace and referred to the textbook where he spoke of an alternator. The alternator was located at the front of the engine, left or right side where it is driven by the fan belt. The lecturer moved toward the fixed engine to show the students where the components were situated and how they work together. He asked the question of; *"What is the function of the alternator?"* The student responded; *"It was to charge a battery."* The lecturer confirmed and stated that the alternator was there to ensure that the battery did not get flat (powerless). *"The alternator is driven by the fan belt; the alternator in turn charges the battery."* He ensured that everyone understood the alternator.

The lecturer moved back to his textbook, and asked the students to refer to page 75 (Liebenberg, 2012). He showed the students the diagram on page 75 figure 5.3 of the ARM NCV textbook (Liebenberg, 2012) being used in that particular year, referring to the conventional alternator and the point type regulator. He now moved on to show the students these components that he has mentioned. While the lecturer went to fetch the components students were discussing what they have just learnt. He brought with him an alternator and showed them the regulator and where it was situated.

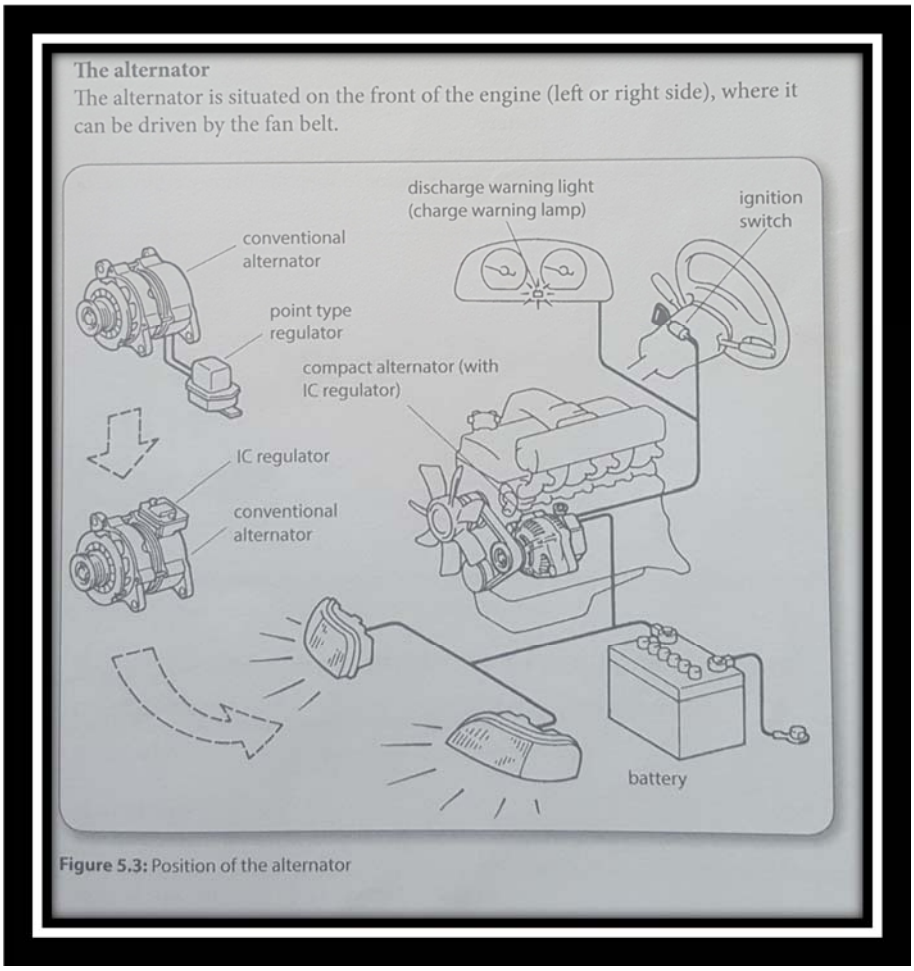


FIGURE 22: PAGE 75 NCV ARM TEXTBOOK

The next component that was discussed was that of the ignition. He referred the students to page 76 where he read *"the ignition system was normally on the side of the engine, close to the cylinder head."* He asked, *"What is the ignition system?"* He then moved toward the chalkboard. He called them over to look at what he was doing.

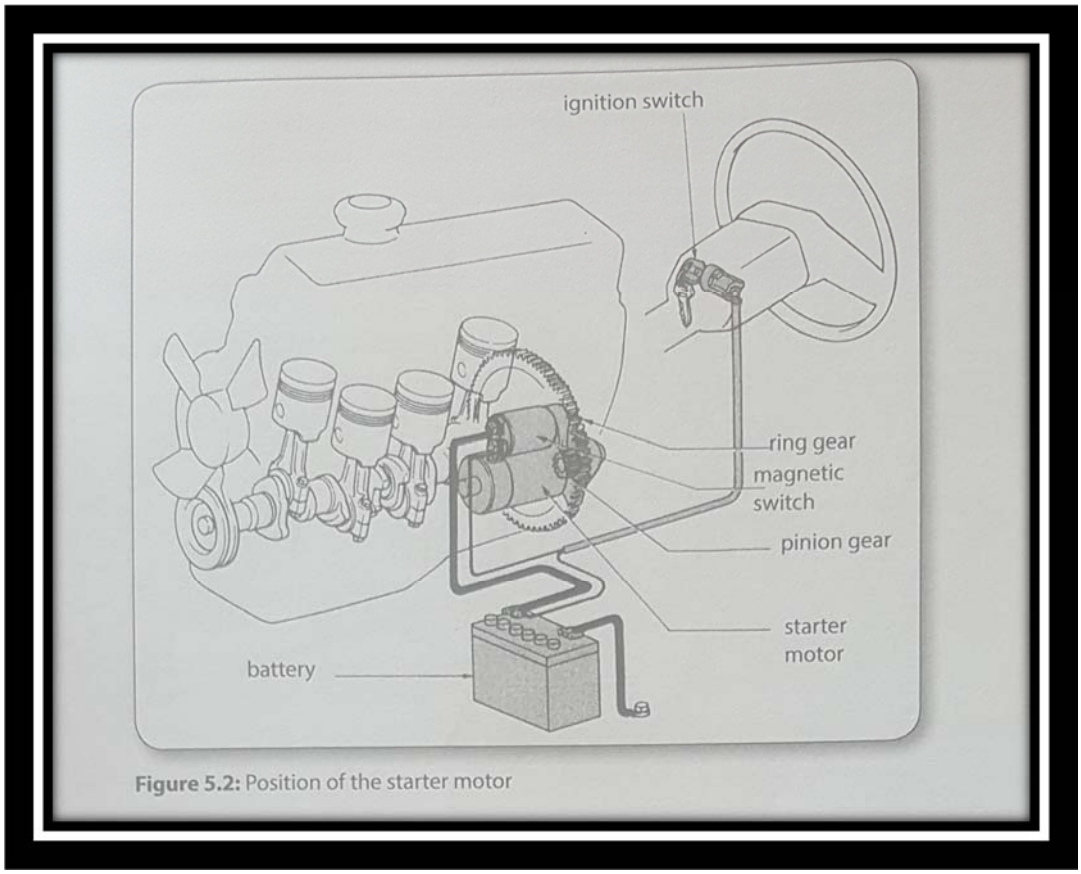


FIGURE 23: PAGE 76 NCV ARM TEXTBOOK POSITION OF THE STARTER MOTOR

Lecturer: “In the car, do you have a key?”

Students: *“Yes”*

Lecturer: “Where do you put the key in the car?”

Students: “In the ignition”

Lecturer repeats: *“In the ignition”*

The lecturer then started drawing on the chalkboard. He drew a picture of the ignition showing that there were wires which were connected to the 12v battery. The battery was then connected to the coil in order to convert the 12v to 20000v. The 20000v then moves to the distributor where the power was then distributed to the sparkplug. The sparkplug was connected to a piston; each piston has an inlet valve, outlet valve and a spark plug. The piston

is housed within a cylinder. He then went on to explain that there were 4 cylinders where power was distributed equally. This implied that you would have to take 20000v and divide it by 4 and you would get 5000v. Each cylinder would get 5000v of power.

He then moved toward the display board to show the students an example of a sparkplug, he also showed them examples of an inlet and outlet valve. He ended the section by asking if the students had any questions. There was no response from the students.

It is apparent that students are not able to apply themselves due to the point that if one question is asked in different ways the student does not comprehend that the questions are really the same. This showed that the student either cannot apply the knowledge to different contexts or that he / she may have a minimal grasp of engineering, or of the language.

Lecturer: “What is the purpose of the inlet valve?”

Student One: “To allow gases to enter the system.”

Lecturer: “This is correct.”

Lecturer: “What is the function of the inlet pipe?”

Students look around at each. The lecturer had rephrased the question and this had left the students confused, they could not understand that the previous question was asked in a different way. There was no correct response from the students.

The lecturer continued by questioning the students about the use of the inlet and outlet valves, there is lots of chattering but the students don’t answer. He then repeated the question.

Lecturer: “What is the use of these valves?”

Student One: “Current flows into the inlet pipe and out of the outlet pipe.”

Student Two: “The inlet pipe allows petrol into the piston.”

He turned to a girl for a response. There was no correct response.

(Important to take note that the lecturer moved back and forth and engaged with the students all the time, however at the same time he does not push them hard enough to get a response from them) He took the students to the vehicle he has in the workshop to explain the correct answer. This question was answered much later on and also in an indirect manner.

Lecturer: *"The purpose of the inlet valve is to allow gases in to the cylinder, to allow for the process of combustion."* (This response was given toward the latter part of the lecture even though it was asked much earlier in the lecture)

Before giving the correct answer he showed them an air filter and asked them to identify the part. One response was a carburettor. The lecturer just giggled. The correct answer, *"An air filter" This is an air filter. What is the use of this component?"* (The lecturer does not wait for a response from students but rather responds almost immediately.) *"It is there to clean the air. Where does the air come from? It comes from the outside and moves through the air filter into the carburettor."* He made sure the students knew what the carburettor looked like and where it is located, he did this showing the students the components on the fixed engine. *"What is the purpose of the carburettor?"*

He moved back to the chalkboard to show them what a carburettor does, by illustrating on the board. He started the explanation again… *"The air from the outside comes into the air filter and moves into the carburettor. (So, what is the purpose of the carburettor?)* He explained that air enters the carburettor from one side and petrol from the other side and still repeated the question as to what is the function of the carburettor? He answered by saying;

"This is where air and fuel atomize. It meters the proper proportions of air and fuel to form a combustible mixture and varies the ratio according to the engine operation. From the carburettor there is an air horn, these gases move into the inlet valve of the cylinder. Once the gases move into the cylinder the inlet valve closes. When the gas gets into the cylinder and then to the combustion chamber, the process is referred to as combustion. When the piston moves up it compresses the gas in the cylinder and the temperature increases. When the gas reaches a temperature of a 1000 degrees it 'explodes' and ignites the sparkplug and forces the piston down and this is how the piston gets its up and down movements. Once it reaches 1000

degrees it ignites the spark plugs. When the gas explodes the useless gas moves through the outlet valve. The inlet and outlet valves open and close when necessary."

The question was asked amongst the students about why the lecturer used the word '*explode*'. Student One explained that it is merely a term and that the gas doesn't really explode or damage anything but merely lets out energy. Students are given a 5 minute break to relax and chat.

After the break the lecturer checked if the students had any questions. He returned to the fixed engine and asked them the purpose of the inlet valve. This was where two students responded that it allows gas in to allow for the process of combustion to occur in the combustion chamber within the cylinder. The piston then compresses the gas and once the gas reaches a 1000 degrees it '*explodes*' once it explodes it ignites the sparkplug and forces the piston downward. This shows that the student has indeed gained propositional knowledge during the lesson.

The question then arose from the lecturer; *"What is the purpose of a sparkplug?"* He asked many students for the function of a spark plug but there was no response. There were two students with the correct response that a spark plug is there to burn out the gases. It is unfortunate that in many instances the lecturer does not confirm or refute answers,

The lecturer returned to the chalkboard, "When the piston is compressing the gas the temperature automatically increases thereby igniting the sparkplug with the 5000v that it received from the carburettor. The function of the sparkplug is to burn the gases that come from the piston during the compression process."

The lecturer then moved onto the battery.

Lecturer: "In majority of the cases the battery is stored in the engine close to a starter motor in order to keep the battery cable as short as possible."

The lecturer brought a battery toward the fixed engine and placed it on the plate, which is located on the engine, as close as possible to the starter motor.

Lecturer: "Why does it have to be so close to the starter motor?"

Student: “It is to keep the cable as short as possible, so that maximum power is maintained.”

Lecturer: “Why isn’t the battery placed at the back of the vehicle?

Student: The shorter the cable the more power there is available.

Although stated above that students are not able to apply themselves to different contexts, this point still remains due to the point that the responses given were from two different students and not one student. Although the work was being explained and demonstrated in many ways there were about ten students that still could not grasp the concepts, this could have be due to the point that they were merely watching what the lecturer was doing, rather than carrying out the task themselves. *As the saying goes “Actions speak louder than words.”*

The lecturer had left the students alone for about 10 minutes, there was much chattering and movement going on and eventually the lecturer arrived and referred them to page 77 *(The Republic of South Africa, 1996).*

This section was on the gearbox.

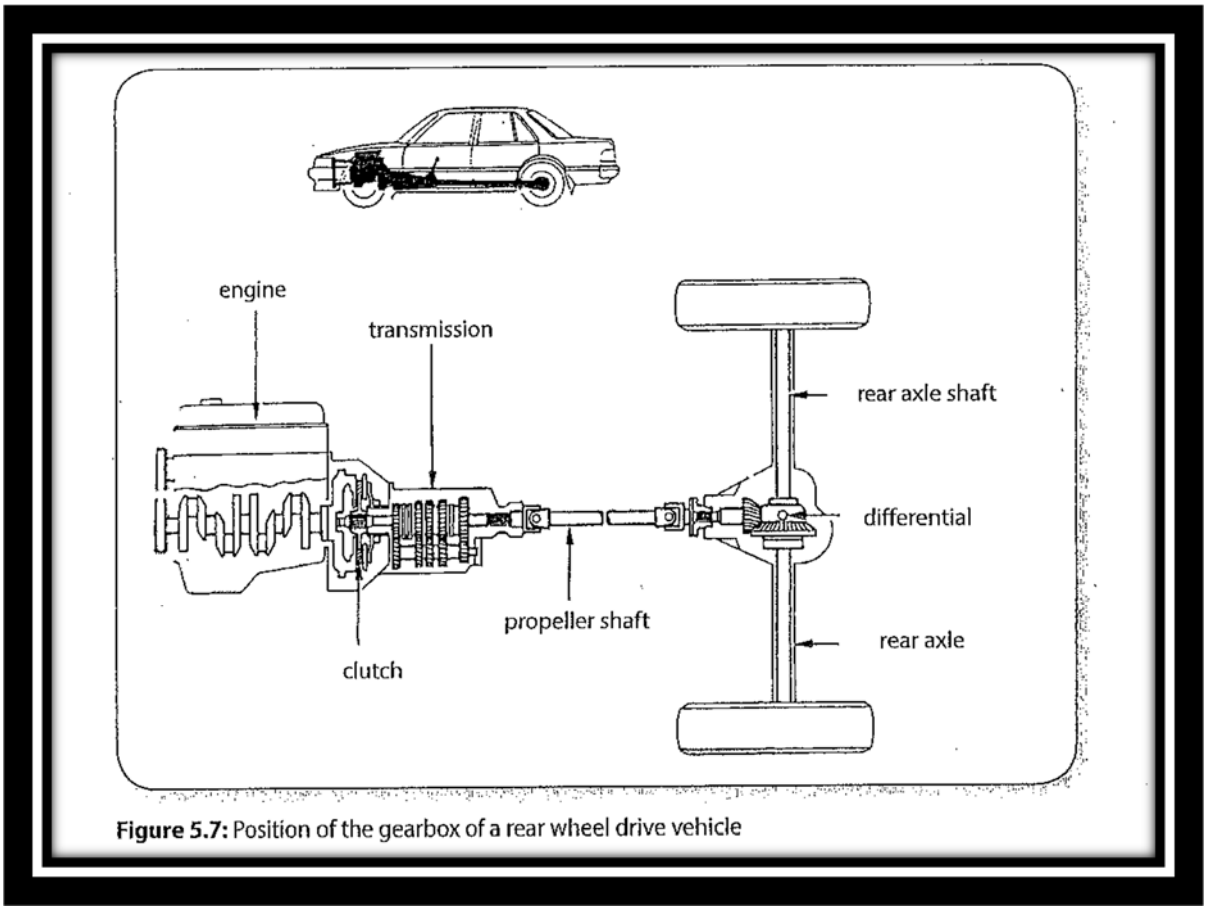


Figure 5.7: Position of the gearbox of a rear wheel drive vehicle

FIGURE 24: GEARBOX NCV ARM TEXTBOOK LEVEL TWO

Lecturer: “The gearbox is bolted on the rear of the engine and it located near the clutch and flywheel. Does anyone know what a gearbox is?”

The challenge was on because the boys are adamant that they know where the gearbox is. The lecturer and class rush toward the vehicle to allow the students to prove their point. The students search high and low and the lecturer laughed and pointed them in the wrong direction. They continued looking until he showed them exactly where it was located. “What is the function of the gearbox?” the lecturer asked. “The gearbox provides a suitable gear ratio for acceleration, hill climbing, for moving at a slow pace, moving backward and a neutral position so that the vehicle can stop while the engine was running,” stated the lecturer. (Once again the lecturer did not wait for the students to respond but rather responded immediately after asking the question.)

The lecturer returned to the chalkboard and explained the concepts to the students. The students requested clarity on a gearbox and the gearbox function was discussed briefly one more time, before the lecture ended.

No.	Episode	Text (knowledge)	Time 130 minutes 100%	Space	Comment
1	Waiting for other students to arrive	None	30 minutes 23%	In and around the workshop	Students generally arrive late due to the distance they have to walk or travel
2	Calling of the register	None	10 minutes 8%	In and around the workshop	
3	Discussion of the engine components	Students gain propositional knowledge regarding the components of the engine	54 minutes 42%	In and around the workshop – mostly near the fixed engine	
4	Recap and Questions	Propositional knowledge	20 minutes 15%	At the teachers work table	
5	Time lost during the class walking to and fro components	None	16 minutes 12%	In and around the workshop	

TABLE 16: SUMMARY OF CLASSROOM ACTIVITIES FOR DAY ONE NON-PARTICIPANT OBSERVATION

Focusing on the discussion and table above, it is noted that sixty four minutes of the lecture focused on propositional knowledge. Forty nine percent of the time was used for instruction and the other fifty one percent was used for administration and walking around. However, the main focus of this lesson was that of propositional knowledge.

5.3.2 DAY TWO (TABLE 22: SUMMARY OF DAY TWO)

The lesson started at 08:00am, students made an impressive attempt to be as early as possible for the Integrated Summative Assessment (ISAT). This is a major assessment conducted for the NCV ARM. During this assessment students carry out practical activities of what they have learnt throughout the year. There are major components that the student will carry out in order to complete the ISAT. The components are as follows:

5.3.2.1 Prepare the workplace according to work site procedures

5.3.2.2 Perform a pre-service inspection

5.3.2.3 Inspect, remove and rotate wheels according to procedures

5.3.2.4 Adjust headlights

5.3.2.5 Inspect the cooling system

5.3.2.6 Remove, inspect, dismantle, refit and test the alternator

5.3.2.7 Write a report on the work done and the vehicle condition

5.3.2.8 Restore the work area

It is important to note that although the ISAT was being completed and all tasks should have been carried out completely, this could not be accomplished. This was due to two main factors; lack of resources and time. Each ISAT takes two and a half hours to complete by each student and there were forty five students. Ninety hours are allocated for the ISAT itself, this does not take into consideration any other factors such as; logistics, absenteeism, late coming, equipment that does not work, etc.

In order for a student to complete one ISAT, can take up to six hours; the question was, was this feasible in a college situation where there are 45 students and limited resources, unlikely that this can be done. When ISAT's are being done there are two students present and the students will start at different assessments and rotate, during this time the lecturer will assess both the students.

During the ISAT, I focused on one student and not both students. Students are given the ISAT document approximately two weeks before they begin their ISAT. This is done so that students are familiar with the document and what is expected of them during the ISAT. The lecturer starts off by explaining what is needed to be done during the ISAT the student is then allowed to carry out the ISAT activities.

5.3.2.1 Prepare the workplace according to worksite procedures

FIGURE 25: STUDENT PREPARING THE WORK SPACE TO CONDUCT HIS ISAT

The student began with preparations for the ISAT. He started off by cleaning up the workshop, sweeping the floors, wiping the equipment, checking that the tools and equipment are functioning and in the correct place. An important point to take note of is that students are not allowed to carry out the ISAT if they do not have their personal protective equipment (PPE). PPE's include; overalls, safety boots, goggles (if required), etc. The cleaning of the workshop and the wearing of PPE's is to ensure that all safety measures are implemented.

The student was given a choice of where he would like to start the assessment. This allowed the student to be more comfortable when carrying out the assessment. The student decided to begin at the vehicle inspection area.

5.3.2.2 Perform a pre-service inspection (see appendix 13)

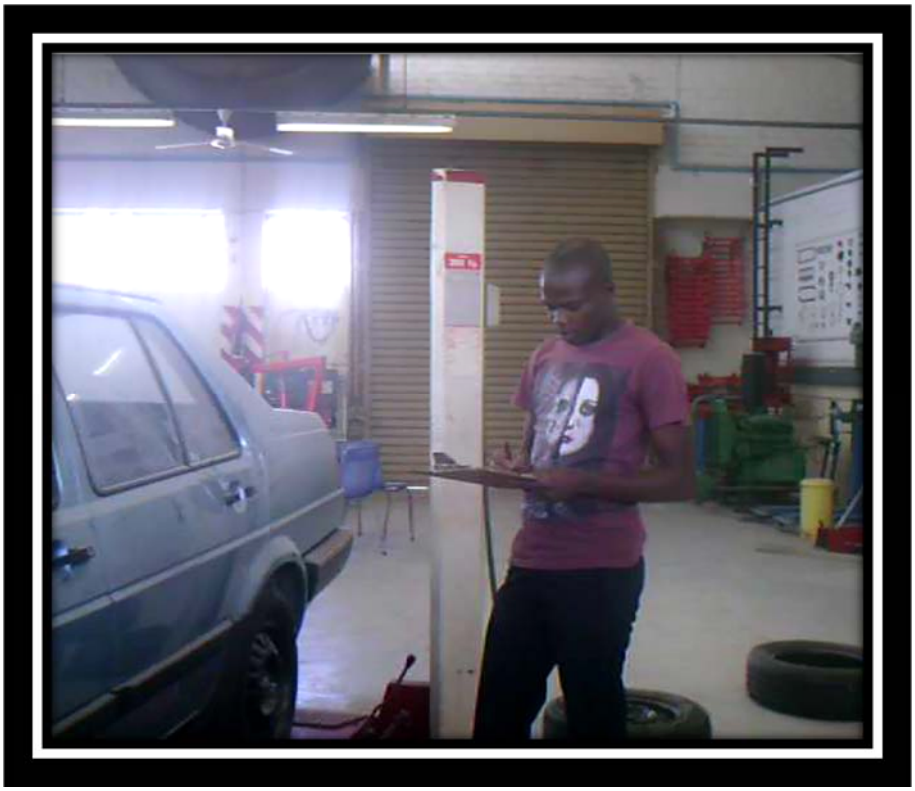


FIGURE 26: STUDENT PERFORMING A PRE-SERVICE INSPECTION FOR HIS ISAT

A vehicle is placed on a four pole hoist. The student was given a clipboard which had a vehicle inspection checklist (see appendix 19) on it. The clipboard in the student's hand was a checklist this would be found in any motor workshop. The student physically checked the vehicle, he walked around the vehicle and he had to apply what he had learned through the year in order to carry out the motor vehicle inspection.

The student started by checking that the car handles are in working order. The student found that a door handle was broken so this had to be ticked off on the checklist in order for it to be repaired. He opened the car door and got in to inspect the interior of the vehicle. All the faults are noted on the checklist that he is carrying around. The student checked if the doors can be opened from the inside. He then checked if the windows can be opened and then closed. He had to open and close all windows in the vehicle in order to carry out the vehicle inspection. He checked if any wires were loose or exposed within the vehicle.

The inspection was carried out in order to check if all the components are in working order. The student found many faults in the vehicle due to the poor condition of the vehicle. The vehicle used was very old and worn.

The student continued his inspection; he walked around the vehicle and got back into the car. He checked again if all the wires are connected or if any are hanging out of their casing. The student checked that all the fuses are in working order if not he had to note that down in order for it to be replaced. The student checked vehicle thoroughly and referred to the checklist many times to make sure he hadn't missed anything.

The student then checked the body of the vehicle for dents and scratches. He ticked these off on his checklist in order to be fixed or repaired. The student continued around the vehicle to check the rear headlights. Constant reference was made back and forth to his vehicle inspection checklist. He took notes that there is no number plate and logged it onto his checklist. The exterior of the vehicle, driver's door had scratches that need to be recorded on his checklist.

He found that a student had written their name on the bonnet of the vehicle. He joked and said that maybe it was one of the teachers that had written their names there. He moved on to check the windscreen wipers of the car, both wipers needed to be replaced. He referred to his clipboard to see what else needed to be done. He realized that he has forgotten to check if the hooter and lights are working. He checked under the bonnet for a battery and did not find one because there is no battery in the car, the hooter and lights won't work.

The lecturer questioned the student as to which lights he was going to change and he responded that the front lights needed to be changed. The lecturer asked; *"How many lights are there at the front of the vehicle?"* The student responded that there is one and then said no there are two; *"The indicator and the front beams."* The student also explained that there should also be a light for the front number plate but there isn't one.

Lecturer: "Have you completed the vehicle inspection?"

Student: "Yes. Sir, are vehicle inspection checklists still used in the everyday workshops?"

Lecturer: “Vehicle inspection checklists are still used in workshops currently. A vehicle checklist is found on a job card in every workshop, before the automotive and repair person starts the job he has to do an inspection of the vehicle to check what is wrong with the vehicle and ensure that the client does not return to say that the workshop employees damaged the vehicle in any way whatsoever.” *(Appendix 19: Vehicle inspection checklist)*

“In a fully functioning workshop the supervisor does the vehicle inspection and says that the supervisor will not check if the lights are working but rather checks the exterior of the vehicle if any of the lights are broken, dents, scratches, etc. this is done to protect themselves and the workshop. A copy of the vehicle inspection should be given to the client and when he comes back he can check his vehicle against the vehicle inspection sheet to ensure all is in the same condition that he left it.”

The student went on to check the oil level in the vehicle. He checked if the oil was in good condition. The student stated that you must have an old rag or paper with you in order to clean the dipstick; puts the dipstick back in and removed it again to check the oil. Oil seemed to be fine and did not need to be changed yet, but the oil was low.

He then moved on to check the oil filter, seemed to be dirty but did need to be changed, it also had oil on it which showed that oil was moving into the carburettor which meant that the carburettor needed to be checked or replaced. He stated that in many cases when carrying out a service an air filter should be changed. The student put the air filter back and closed the case.

The student stated that also when doing a service the oil filter should generally be changed. He checked for any other oil leaks that may be visible in the engine compartment. He identified the radiator and noticed that there was oil in those areas; he then stated that there should not be any oil near this component. The student continued to check the pipes of the engine compartment, he found that the water pipe had a leak and needed to be changed. He identified a petrol filter. The petrol filter needed to be replaced as it is old and worn.

The student then went on to check the water bottle; this is the water that is used to cool the engine of the car. The water needs to be added as it is low. The student then moved on to check underneath the car, he needed to check for any leaks that may occur. He checked if the

exhaust had any leaks. He also checked the brake pads. He used a four pole hoist machine and requested assistance from the lecturer in order to raise the vehicle. (Students are not allowed to operate the hoist on their own due to safety reasons). The four pole hoist machine is to elevate the vehicle in order for the student to view the vehicle from under without having to get on the floor.

Take note: activities were not completed as per the ISAT document but rather to the liking of the student. The lecturer agreed with this provided most activities from the ISAT document were completed.

5.3.2.3 Tyre rotation and balancing

FIGURE 27: STUDENT ROTATING TYRES ACCORDING TO IN HOUSE PROCEDURES

The activity carried out by the student was that of the tyre rotation and balancing. A limitation with this activity was: the tyres were placed on the workshop floor and not on the vehicle and the tyres were labelled with chalk. The student then had to move them to their correct places. This was done due to the time constraints and lack of resources. Balancing of the tyres was not done again due to time constraints and lack of resources.

Before carrying out the rotation of the tyres the student prepared himself for this exercise. He checked the tyres for any leaks by carrying out a physical inspection. The lecturer began by explaining to the student the process of the tyre rotation. He stated that the student should imagine that the tyres are on a vehicle and that the car is parked facing a certain direction.

The lecturer asked the student to explain the process before he starts the wheel rotation. The student stated that he would ensure that the workshop is clean and cleared of all clutter. He would then get into the vehicle and ensure that the ignition is turned off, the handbrake is up and also ensure that all doors are closed. An important task to carry is to check that the jack is working. Place the jack underneath the car and jack the car up.

Student: “Am I rotating all the tyres.”

Lecturer confirmed. The student tells the lecturer that the car is now jacked up and he will remove all the tyres and place them in the area in front of where they were removed. The lecturer then questioned the student as to how would he rotate the tyres. The lecturer had placed the tyres on the floor as if they were removed from the car. The student had to then move them into the correct place to be ready to put back onto the vehicle. The tyres placed on the floor include that of the spare wheel.

The student is asked to mark the tyres. He marks them FR – front right, FL – front left, BR – back right, BL – back left and W for spare wheel. Student confirmed with lecturer what type of rotation he should do. The lecturer stated it should be a *radial cross.* Student walked about first thinking about what should be done. Student moved BL to FL, FL to BL; he moved W to the BR space, BR to FR space and FR took the place of the spare. He called the lecturer to show him what he had done.

The lecturer stated that the rotation was correct. He had to put the tyres back in the original order and wiped of the markings that he made, in readiness for the next student.

The student did not remove, inspect, dismantle, refit and test the alternator due to time constraints and once again resources. He ended the ISAT by writing up his report of the tasks that he had completed and listed all the components that needed to be changed or replaced in the vehicle.

The ISAT reflects Rauner's (2007) model which implies that work process knowledge, in this case the NCV ISAT, clearly shows how propositional knowledge (theory) and practical knowledge integrate and how one is required in order for the other to function optimally. This is a key point, during the ISAT, the student must have been taught the propositional knowledge in the classroom situation and the practical knowledge in the workshop situation. This enables the student to apply himself when carrying out the ISAT in the workshop, whereby he has to remember what was carried out in the classroom and / or workshop scenarios in order to complete his ISAT.

5.3.2.4 Adjust headlights

FIGURE 28: THE INSTRUMENT USED BY THE STUDENT TO CONDUCT THE HEADLIGHT ADJUSTMENT

The next activity was for the student to conduct the headlight adjustment. The lecturer mentioned to the student that he would be merely explaining what would be done as the lights do not work in the vehicle neither does the headlight adjustor.

The student explained to the lecturer that he was conducting his headlight adjustment. Before conducting the headlight adjustment it is explained by the student that he has to measure the distance from the car to the headlight adjustor. The distance from the light on the vehicle to

the headlight adjustor has to be 700mm. Student fine-tuned the headlight adjustor accordingly to the ruler that he had in his hand.

The lecturer handed the student the tools that were required for the task to be completed. The student took about eight minutes to get the distance correct between the vehicle and the headlight adjustor. The headlight adjustor must be parallel to the headlight on the vehicle. The component on the headlight adjustor moves up and down and this allows the student to get the light on the vehicle parallel to the headlight adjustor (this took more or less another 5 minutes to do)

The student then adjusted another component on the headlight adjustor which allowed him to check if the lights on the vehicle are correct. He then looked through a glass at the top of the headlight adjustor to check if the lights are adjusted correctly. The lecturer stated that the student should make him aware of when he has completed the task. The glass has a laser in it and when the student looked through it will show whether the lights on the vehicle are aligned or not. This took another 10 minutes, the student wanted to make sure that the lights are aligned correctly. The reason it took that long was that the headlight adjustor was not locked in place once it was aligned.

Once the headlight adjustor is locked in place only then will the laser be visible and give you a correct reading. The lecturer questioned the student as to what was he doing for so long and he replied that he wanted it to be as accurate as possible. The student called the lecturer to state that he was done and the lecturer approached the headlight adjustor, looked through it and made a note of it on his report for the student. The student stood next to the lecturer where he explained the faults to the student; the wheels on the headlight adjustor were not parallel to the vehicle. The lecturer then looked through the headlight adjustor to assess whether the adjustment was correct or not.

Lecturer (to student): “Look through the mirror of the headlight adjustor and tell me what you see? The laser was a bit skew even after the student had checked it many times.”

The lecturer asked the student some questions:

Lecturer: “If you are going to adjust your headlights on the vehicle now and your headlights are too high, which implies the lights are shining too high up. How will you adjust the headlights to ensure that it is correct?”

Student: “I would use the screwdriver to loosen the light in order to correct the light.”

Lecturer: “Let me ask the question again. If the headlights on your vehicle are reflecting too high, how would you adjust them?

Student: “I will loosen the screw.”

Lecturer: “This is the incorrect answer.”

Student: “Sir, this will allow the light to be adjusted correctly.”

Lecturer: “The screw would have to be tightened in order for the light to be adjusted correctly. Once the light has been adjusted, what is the next step?”

Student comes back to the headlight adjustor to check if he had forgotten anything.

Lecturer: “You need to finalize the adjustment.”

Student: “Yes, sir. I need to write up my report.”

Lecturer: “Are you forgetting anything?”

Student stood back thinking about what should be done

Student: “I believe I am done here.”

Once again the correct answer is not made explicit to the student and although this is a formal testing scenario, in the future the student will not know what is correct or not. The student will not be able to identify legitimate text due to the point that realisation rules were not made explicit.

5.3.2.5 Inspection of the coolant system

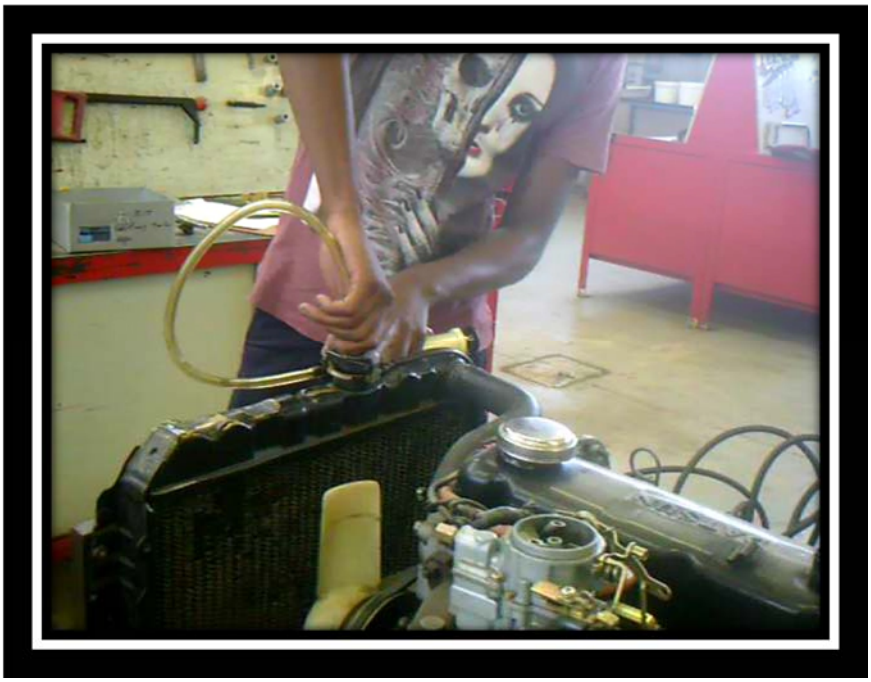


FIGURE 29: STUDENT INSPECTING A COOLING SYSTEM DURING HIS ISAT

The student stated to the lecturer that the next task he was going to complete was the coolant system. He removed the radiator cap. He showed the lecturer the cap and explained that when the pressure goes up there should not be any leaks in the radiator cap. He used a pressure tester to check the cap. He had the tester with a tube like object in his hand, he placed one end of the tester on the radiator cap and the other end was not visible to him. The student seemed to be struggling to put the pressure tester onto the radiator cap.

The lecturer then stated to the student that he did not require the tube like object to complete this task. Student finally got the cap onto the pressure tester. The pressure tester has a pump at the bottom of it. The student stated that he had to pump it (force down and pull up the lever). The student showed the lecturer that the pressure meter is between 98 degrees and 100 degrees so this implied that there were no leaks and the radiator cap did not need to be changed.

The student then moved on to check the radiator itself this is where the tube like object is used. One end is put into the pressure machine and the other end of the tube is put onto the radiator itself. He checked for any air or leaks in the radiator. He pumped it again to check

the pressure. The machine does not seem to work, the student looked around to see if he had left anything out. The lecturer comes in to show the student what to do. He told him that he should take it to the minimum setting first and then tighten. The same should be done at either end.

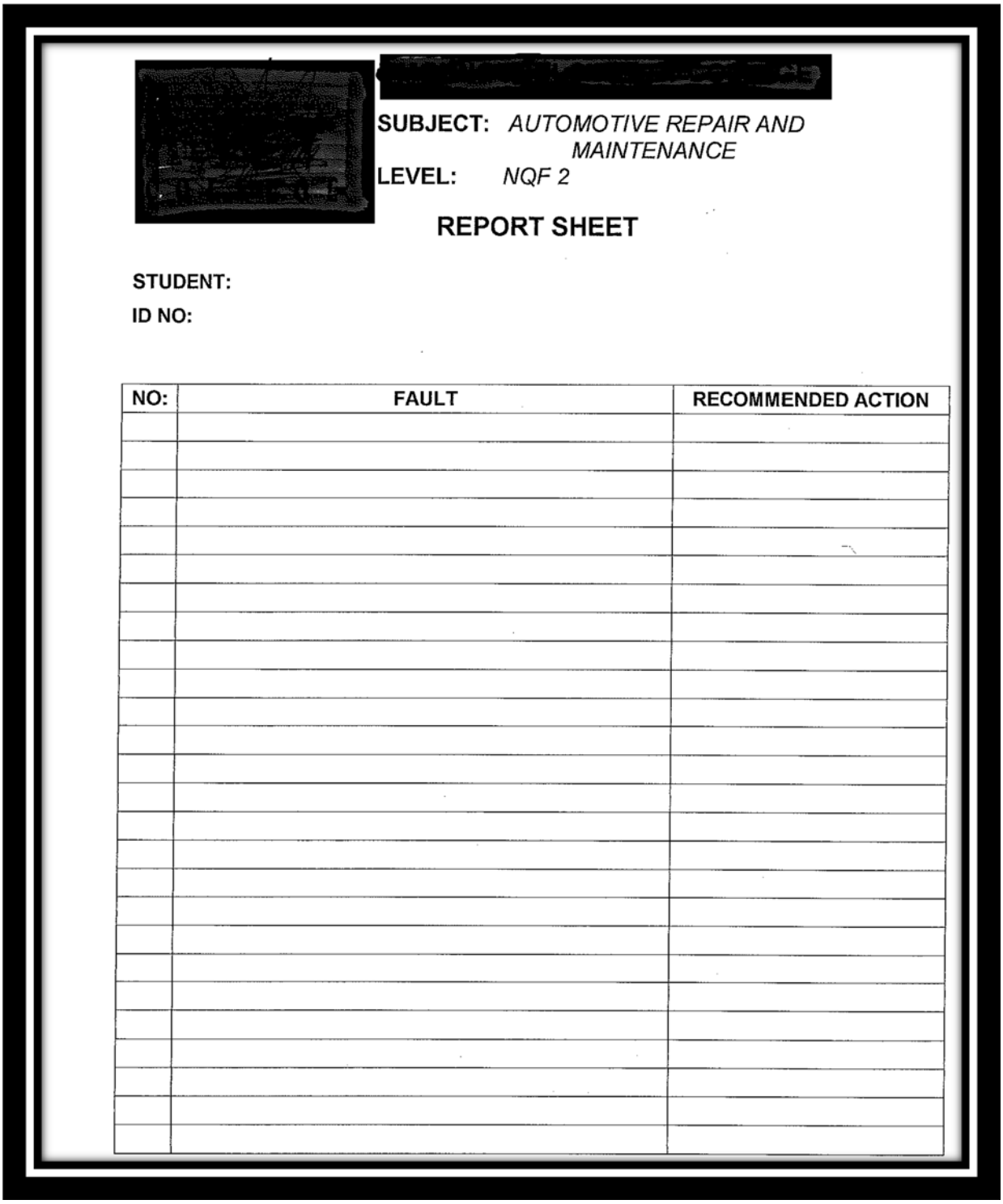
The lecturer showed the student what to do at both ends and the process it is done in. The student then began the pumping process to check for air or leaks in the radiator. The pressure clock seems to be lowering in pressure. The student stated that this shows that there are leaks in the radiator. He removed the pressure tester and placed it back in its case. He also replaced the pressure cap. He then had to check for the leaks on the radiator. He started by physically inspecting the engine and found that the pipes had leaks in them and needed to be replaced. The lecturer stopped him and stated that he should have checked for leaks when the pressure machine was on rather. The lecturer told him to continue, the student looked for leaks without the pressure machine. He told the lecturer that he now had to write up the report of the pressure testing.

The student showed that he possessed the necessary propositional knowledge in order to carry out the task. This was known due to the fact that he could repeat what he had learnt but was unable to carry out the task to the best of his ability. This shows that although you may have the propositional knowledge you must be able to apply yourself (work process knowledge) to the activity. Although the student had both the propositional knowledge and practical knowledge he was not able to apply himself to the task on hand.

5.3.2.6 Remove, inspect, dismantle, refit and test the alternator

This activity was not carried out due to time constraints and the fact that there were no resources to carry out this activity. In other words, there was no alternator system for the student to make use of.

5.3.2.7 Write a report on the work done and the vehicle condition



[redacted]

SUBJECT: *AUTOMOTIVE REPAIR AND MAINTENANCE*

LEVEL: *NQF 2*

REPORT SHEET

STUDENT:

ID NO:

NO:	FAULT	RECOMMENDED ACTION

FIGURE 30: THE DOCUMENT ON WHICH THE STUDENT WOULD WRITE THEIR REPORT OF THE WORK DONE AND THE VEHICLE CONDITION

The above document is that which the student would write his final report. The report would consist of the work that was completed and the condition of the vehicle before and after the service or work done.

Unfortunately, the student did not hand in his report when he had left and because this is a formal examination the lecturer refused to take it once he had left the room. The lecturer did so due to the point that the student could have consulted with another person or textbook and adjusted his answers.

5.3.2.8 Restore the work area

The student restored the work area in readiness for the next task that may be assigned to him. A point to bear in mind here is that the ISAT (practical component) can only be carried out if the student has acquired the propositional knowledge (theoretical knowledge). The propositional knowledge is the underpinning knowledge that the student will us to carry out the practical activity.

No.	Episode	Text (knowledge)	Time 130 minutes	Space	Comment
1	Register for two students	None	5 minutes 4%	At the teachers table	Only two students at a time for the ISAT
2	Lecturer preps students prior starting the ISAT	Propositional knowledge	5 minutes 4%	At the teachers table	
3	Student conducting ISAT activities	Work process knowledge	110 minutes 85%	In and around the workshop	
4	Recap per student	Propositional Knowledge	10 minutes 8%	At the teachers table	

TABLE 17: SUMMARY OF CLASSROOM OBSERVATION DAY TWO

On day two the focus was on work process knowledge. The student had to know the propositional knowledge in order to carry out the practical knowledge and in turn be apply to apply himself where necessary. In certain instances when the student was carrying out a task the lecturer would question him about what the component is, why is carrying out such a task on that component, what is the function of that component, etc. It was imperative that the student knew the propositional knowledge in order to carry out the practical knowledge in order to apply himself correctly; i.e. work process knowledge.

5.3.3 DAY THREE (TABLE 23: SUMMARY OF OBSERVATION FOR DAY THREE)

FIGURE 31: LECTURER DEMONSTRATING HOW TO STRIP AN ENGINE

The lesson began at 8:20am; students were excited about today's lesson due to the fact that at the end of the previous class students were told that they would be given the opportunity to strip an engine. Students enjoy practical activity. Students learnt the process of stripping an engine, and here the main idea was for the students to learn the parts of the vehicle rather than the actual process of stripping the engine.

Both students and lecturer stood for about 5 minutes just looking at the engine.

Lecturer: "There are certain tools that are required in order to strip an engine."

The lecturer had a tool box next to the engine which he told the students that only certain tools will be used when stripping the engine. He asked them to gather around and bring the tool box closer. He states that there is a certain way to strip the engine.

The engine must not be banged or hammered, it must be stripped carefully. He then went on to start the process of showing them how to strip an engine. He pointed at the radiator and questioned the students as to what the component was. Students responded correctly.

Not all students are wearing PPE's. This does not comply with safety regulations in the workshop, but the lecturer did not comment on this. This reinforces the point that the lecturer does not make the correct behaviour that should be carried out in the workshop explicit to the students. At the end of the lesson the students are unsure of what is correct or incorrect behaviour or answers.

He then picked up a screwdriver and started unscrewing the radiator. He explained that when unscrewing the radiator, you should turn the screwdriver in an anti-clockwise direction. He told the students that they should be cautious when removing the screws and keep them in a safe place so that they can be found when they need to be put back. He stated that there are six screws that need to be removed in order to remove the radiator. He told the students that they should make sure they are using the correct tools when stripping the radiator or any part for that matter.

While the lecturer is stripping the radiator the students just stood and watched; they were not part of the process. The stripping of the radiator took approximately 15 mins. He removed one nut and bolt and then the radiator casing was removed. He told them that once they remove the casing they should turn the casing over and put the nuts and screws in their original place for safe keeping.

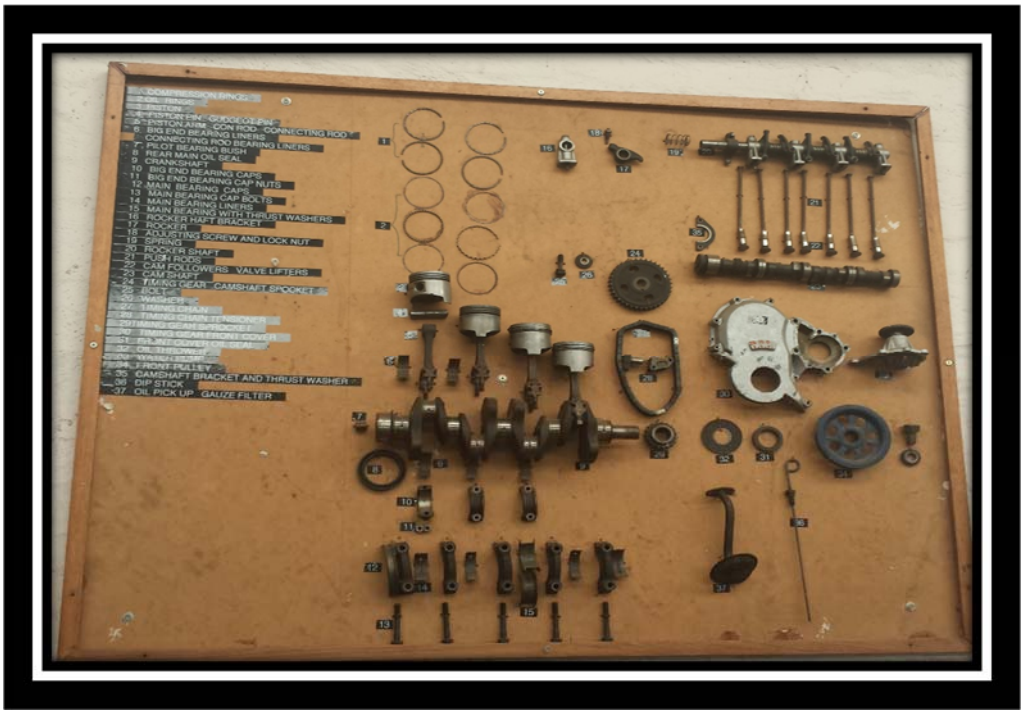


FIGURE 32: THE BOARD THAT THE STUDENTS WOULD USE AS A REFERENCE FOR THE STRIPPED ENGINE PARTS

Lecturer: “Before stripping an engine the workshop must be clean and clear of all dirt and clutter, this is so that tools, screws, etc. don’t get mixed up and parts can be found when you need them. Also the workshop must be clean so as to follow proper safety regulations and so that as you are working in the workshop you do not trip or fall.”

Once the casing is off he asked the students to identify the cylinder head. Students could not identify the cylinder head on the engine so they were asked to go to the diagram board and locate it there and then return to the fixed engine and were then able to identify it.

The students walked toward the board and looked at it for about 5 mins discussing amongst themselves which is the cylinder head. They find the part on the board and rush back because they now know where the part is on the actual engine. He then asked them what size spanner should be used to remove the cylinder head and they reply with a twelve inch spanner. The lecturer searches for a while for the torque wrench fitting and finds a seventeen inch which he showed them will not fit on the bolt because it is too big.

He asked the students how they would use the torque wrench to open the bolt. He asked if he should move it toward him or away from him in order to loosen the bolt. Some students

replied that it should be moved toward him and others replied away from him. The correct answer was that you would push the torque wrench away from you in order to loosen the bolt and then continue turning the wrench around until the bolt is removed. There are eight bolts that must be removed.

While loosening the bolts he explains to the students the components that surround the gasket and shows it to them on the board by pointing at it from where he is standing. He also told them that as they are stripping the components they need to keep them in one place so that they can be found and used when needed.

He states that all the components that he is stripping should be put back in the correct order so as to not damage any other components. He shows them how to remove all the components. He explained that the component that he removed was the gasket cover. He then allowed the students to remove the bolts that he loosened and placed them together in the tool box.

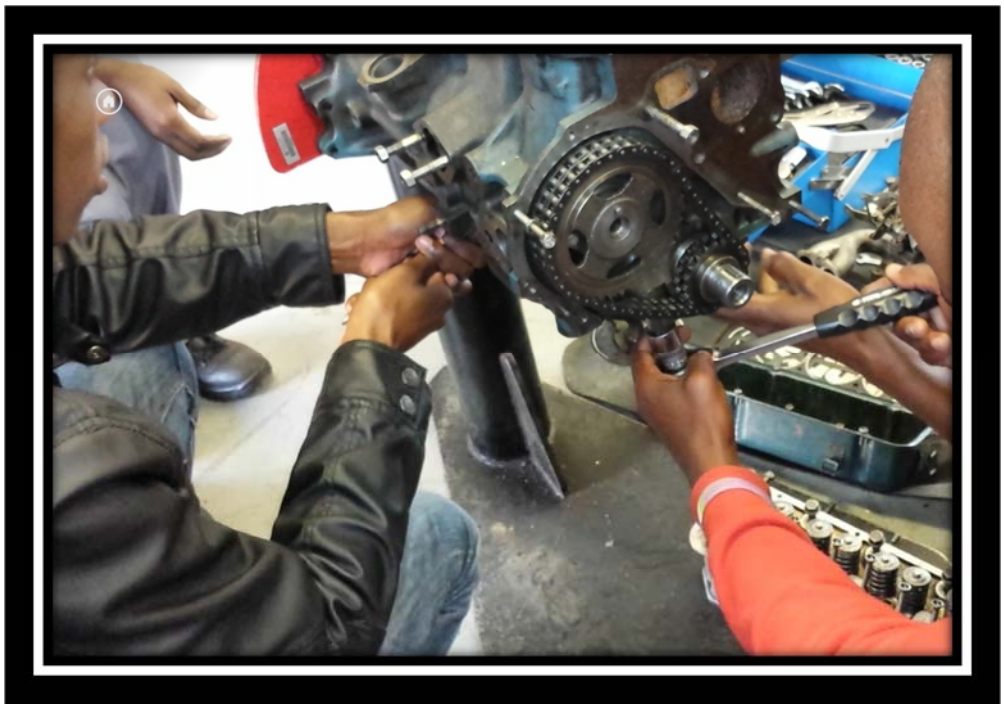


FIGURE 33: SEVERAL STUDENTS STRIPPING AN ENGINE AT ONE TIME

One student began to loosen the bolts in order for him to remove them. The other students stood and watched him. The students began taking turns in removing the bolts, they all had a turn to loosen the bolts and remove them.

He allowed another student to strip the manifold. The student questioned the other students as to what size spanner should he use and they replied a ten inch spanner. So he went to the tool box and found the ten inch spanner and started unlocking the bolts.

Now students decided that they will not wait for a turn and students begin finding parts that they can remove. At any given time there are more than four to five students working on the engine, removing components.

The students did not listen to the lecturer due to the point that they are removing parts of the engine and instead of placing them in their respective groups they are merely throwing them around. When it is time to put the engine parts back together, this will be a difficult task for students.

He groups the students into those that are removing the manifold and those that are removing the tapit cover. He stopped the students and reminded them that the groups must keep their components together, if it gets mixed up it will be very hard for them to identify where it goes since they are still learning.

Students are removing the components assigned to them; there was a lot of chattering while this went on. There were many students removing tools from the toolbox. Once they all had their turn very few continued working on the engine, the rest continued talking and looking around.

There were few hands stripping the parts of the engine eventually, I assumed that the students got tired of standing around. At least six students had a tool in their hand stripping the engine. Tools were being flung back into the toolbox and components were not being placed in their groups.

One of the students questioned the other student who was removing a component as to what was that component and the student could not answer. The lecturer was not there to respond; he had left the students and returned to his office.

They ask around and there is a student that tells the others that it is a carburettor, they also remember that they can go to the board in order to identify the component from the chart placed there.

Students play around with the engine as they are stripping it and they try to guess what that part does. One student turns a part and makes the sound of an engine when it is being revved and says that this part is what makes the engine rowdy or silent.

One student is writing down all the parts that they are stripping in order for her to remember it later. As she is writing down the parts the students try to explain what the functions of the parts are. They have eventually laid down the parts, in order and have started placing the components and its parts together.

They continue removing parts piece by piece and as they go on they learn to keep the components together to enable the assembly of the engine to be easier. Students continue with a lot of unnecessary activities since the lecturer is not there to supervise so they just continue stripping the engine and make idle chatter. Students are unsure of how to remove parts of the engine so they pull and push and shake around the components until they see something that is familiar and then try to remove the part from there.

Even the process of stripping the engine is to identify the parts of the engine and its function. There are many instances where the students turn to each other to ask what is the part that was just removed and everyone is baffled, they are unsure of what the part is and therefore the function is unknown. They have not remembered to check the chart yet.

The activity has become trial and error for the students and also somewhat of a mystery due to the point that they cannot identify the components that they are removing. At this point many students have gone astray there are not more than five students working on the engine now compared to that of as many as nine previously.

One component could not be stripped so the student begins to place the part back into position and places the screws back. The students finally remember the engine chart and look back and forth at the board to see if they can identify the parts that are being removed but they still find it difficult to do so.

Some students do not even know how tools should be held in order to remove parts. If there was supervision then this would be an easier task. Students have found a measuring tape which they are now playing with. There seems to be just two students working on the engine now. They have seemed to lose interest because they are lost regarding the way in which to remove parts and the activity has become a trivial one.

They have managed to remove another part and seemed to be excited about this since it took almost twenty minutes. They rush to the board to match it to the components there.

They have found that the part is a gasket. Other students have come back to remove the part that the first student couldn't. They are shaking and lifting the part, trying to release it from its case. They do not know what this part is.

Many students seemed to have returned from all over the workshop back to the area of stripping the engine. They have removed yet another part but are still struggling with the one; they make guesses about what the part might be but are not really sure. The lecturer had returned at this point. The students have finally managed to remove the part that many struggled with, however this was done without the help of the lecturer.

Students continue for the next twenty mins in the same manner attempting to strip the engine and find out what each part is and what the function is. When the lecturer was there at the beginning and began stripping the engine students were interested because they could see what was going on and he explained what each part was and what the function was. When the lecturer left this became a difficult task for the students since they did not know what the name of the component was or what the function was.

The boys are stripping the engine now and the girls seem to be taking each part to the board and finding the names and thereby being able to find the function. There was a discussion where they decided that they need to know what the names of the parts are. They decided the

girls will find the names and functions and return to inform the boys the names and the functions of each part. This seems to be working now and they feel better about the learning process they don't sound so confused anymore.

This continued for the next fifteen minutes and the boys continued to explore the stripping of the engine while the girls moved to and from the engine board. After about twenty minutes they managed to remove the part they called the sump which was correct after the girls confirmed it on the board. A point to take note of is that although there were many of them attempting to strip the motor they did not argue over who stripped and who didn't but rather they assisted each other and guided each other along. However the task could not be completed because the time for the lesson was completed and they had to go for their tea break and then attend the next lesson.

No.	Episode	Text (knowledge)	Time 130 minutes 100%	Space	Comment
1	Register	None	20 minutes 15%	In and around the workshop	
2	Observing the engine	None	5 mins 4%	At the engine	
3	Stripping of radiator	Propositional and practical knowledge	15 minutes 12%	At the engine	
4	Consultation with information board	Propositional knowledge	15 minutes 12%	In the workshop	
5	Stripping of gasket	Propositional and practical knowledge	20 minutes 15%	At the engine	
6	Stripping of the sump	Propositional and practical knowledge	20 minutes 15%	At the engine	
7	Average amount of time lost during lecture	None	35 minutes 27%	Walking around the workshop aimlessly	This was partially due to the absence of the teacher

TABLE 18: SUMMARY OF CLASSROOM OBSERVATION DAY THREE

On day three the lecturer shared the propositional knowledge with the students, he then demonstrated very quickly how to start stripping an engine. He then left the students to carry out the activity on their own. However, this practical activity was not very beneficial at first and students lost much time trying to figure out what should be done. As time passed started consulting each other as well as the board with the parts of the engine on it. This made it easier for them to identify the various engine parts.

The focus of day three was that of propositional knowledge delivered from the lecturer to the students and practical knowledge carried out by the students. It must be noted that students did not complete stripping the engine on day three. This is a disadvantage in the fact that the next class that would come in would continue from where this class left off. Both classes would have to share and therefore would not strip certain parts of the engine thereby possibly not learning that part of the engine.

5.3.4 DAY FOUR (TABLE 24: SUMMARY OF OBSERVATION FOR DAY FOUR)

Once again the lesson began at 08:00am and again this was assumedly due to the point that the students were going to be working on the engine. Students are now reassembling the engine. Take note that although the students did not complete stripping the motor on day three another class would have completed it for them, this is due to the point that they are sharing engines between classes and start where the other class ends. This could be a limitation due to the point that, the previous class could have stopped stripping or assembling which the other class has already done. This would mean that a class would be repeating an activity. This could be a disadvantage because students could miss important learning areas.

They are now reassembling an engine where assembly was started by another class. The process is much quieter now many of the parts are in place, put there by the previous class and they are now putting in the screws and tightening up. They continue this process for the next thirty minutes.

Once again the lecturer is not present. Students are using tools incorrectly and this could be hazardous as they could hurt themselves. A student had replaced a case, as they called it, but it was incorrectly placed. Another student has removed it and stated that another part has to be replaced before the case is put back. Once again the students are working on trial and error, where parts are being put in and then removed because they are incorrectly placed.

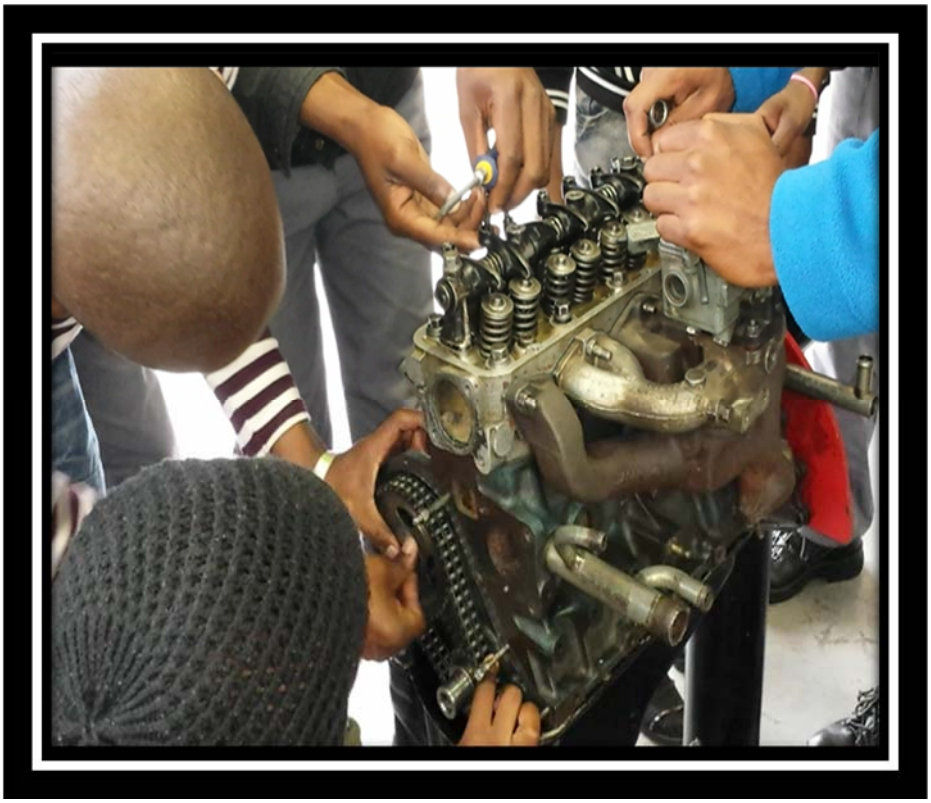


FIGURE 34: STUDENTS USED TRIAL AND ERROR WHEN ATTEMPTING TO REASSEMBLE THE TIMING CHAIN

There were instances where parts were not fitting the students would shake it in or bang it with their hands into the area, with the hope that it is the correct place. The ‘timing’ chain was the most difficult for the students; they had a hard time finding the correct way to put it back. Many students tried and many students failed. They decided to strip that component again and restart. This in a way is a good thing it forces the learners to learn the different parts of the engine and find out how to replace the parts. It can also be negative because there is no supervision, so even if the part does fit they are not sure if it is correctly placed or not. They finally found the correct way to put the timing chain back in place.

It is noted that some students have the ability to put back some components and others have the ability to put back others but they cannot assemble the engine on their own because they help each other in the process. If a student does not know how to replace a component then there is another one that does.

This is sometimes a great learning process, where students can learn from each other. It seems to show that the student learned from their peers in a practical situation. The casing is finally put back onto the timing chain. This activity took more than 30 mins to complete. Students

seem to still have screws and parts available after they have seemingly put together the engine. The lecturer has arrived to see that parts have not been put back. The lecturer left with no comment and the students did not manage to finish the assembly by the time the lecture was over.

No.	Episode	Text (knowledge)	Time 130 minutes 100%	Space	Comment
1	Register and standing around	None	15 minutes 12%	In and around the workshop	
2	Lecturer and students gather around the engine and have a general discussion	Propositional knowledge	10 minutes 8%	At the engine	
3	Reassembling of the engine	Propositional and practical knowledge	30 minutes 23%	At the engine	
4	Walking around aimlessly	None	20 minutes 15%	In and around the workshop	This was partially due to the absence of the teacher
5	Reassembly of timing chain	Propositional and practical knowledge	30 minutes 23%	At the engine	
6	Continued with reassembly	Propositional and practical knowledge	25 minutes	At the engine	Continued until the end of the lecture

TABLE 19: SUMMARY OF CLASSROOM OBSERVATION FOR DAY FOUR

This lesson was similar to that of day four where both propositional and practical knowledge was required in order to carry out the task. A key point to take note of is that if the lecturer was more supportive and supervisory the learning process would have been easier for the students. The students would have grasped both propositional and practical knowledge faster and easier.

5.3.5 DAY FIVE (TABLE 25: SUMMARY OF OBSERVATION FOR DAY FIVE)

Students are now working on a ‘new’ engine, ‘new’ meaning a later model than the previous one. The lecturer has shown them how to lift an engine off a vehicle / ground with the use of a portable hoist. There is only one student working on the engine while the others are standing around and chatting. It seems like the student could not strip a part in the new engine and another student went to call the lecturer to assist. The lecturer arrived and demonstrated the process. The students managed to loosen the engine from the frame. The students have no idea where to start on this engine because unlike the old one the parts are more electrical rather than where he could put in a spanner and unscrew something.

The students have moved the engine to a fixed unit where they can now work from. The task of this lesson was to show the students how to move the engine from the floor to a fixed unit in order for them to work from it. The lecturer showed it to them once and then the students continued moving it from the floor to the fixed unit. There were many engines on the floor which the students moved around.

The process was as follows throughout the lesson: the engine would be located on the floor. The students would then attach huge hooks to the engine. This is to carry the weight of the engine and then another student will turn a handle which will elevate the engine. The students then move the engine to a stand where the engine will be fixed. The engine must be placed correctly in order for it to be locked into place on the stand and then the students are able to work on it. They then release the engine back onto the floor in order for the next student to do the activity.

FIGURE 35: THE ENGINE AND PORTABLE HOIST THAT WAS USED DURING DAY FIVE

No.	Episode	Text (knowledge)	Time 130 minutes 100%	Space	Comment
1	Waiting for the lecture to start	None	15 minutes 12%	In and around the workshop	
2	Register	None	10 minutes 8%	In and around the workshop	
3	Lecturer demonstration of how to lift and release an engine	Practical knowledge	10 minutes 8%	At the engine	This was a mobile engine, where the students would lift the engine off the ground with a piece of equipment and release it in a different area
4	Students carry out the task	Practical knowledge	80 minutes 62%	With the engine, in and around the workshop	
5	Loss of time	None	15 minutes 12%	In and around the workshop	Students walking around while others are busy, sometimes the students would just stop working and talk

TABLE 20: SUMMARY OF CLASSROOM OBSERVATION FOR DAY FIVE

Day five focused on students using their practical knowledge. The lecturer explained the process to the students and demonstrated how to move an engine from point A to point B and then allowed the student to carry out the activity without his supervision. Students had to remember what was taught to them and then carry out the task. Both propositional and practical knowledge was required in order to carry out the lessons task.

5.4 DISCUSSION

Many themes, such as time usage during lessons and time for the practical tasks, student's preference for practical actvities, learning barriers, lack of resources, and the lecturer's feedback became explicit when conducting this research.

PRACTICAL ACTIVITIES

It was noted that students appeared to prefer participating in practical activities compared totheory. During the lectures students moved around at a slow pace and did not really want to participate in the classroom activities. However during the practical activities, students became excited and wanted to be part of the activities.

In many instances during the practical activities, students took initiative and carried out the tasks without being told by the lecturer as to what should be done. However during the lectures when the lecturer asked a question or was busy sorting himself out, students would merely stand around chatting.

This is also evident that in the five days that the research was carried out, only day one was focused on propositional knowledge, day two, three, four and five were all focused on tasks of a practical nature. Given that the research was only carried out over a five day period, I cannot assume that the lecturer preferred practical knowledge over propositional knowledge but rather state that this was probably the way in which the curriculum rolled out. The notional hours required to carry out NCV ARM level two is two hundred hours compared to that of my eleven hours of classroom observation.

From a theory / propositional knowledge point of view, the syllabus covers the majority of that which is needed to enter into a trade. At level two students must know the various components of a vehicle, when people are talking about clutches and gear boxes; the student must understand what the client/customer is talking about. A major component of the SAG is for the student to gain knowledge regarding the components of the vehicle, its functions and its location in and around the vehicle. This makes it easier for the student when he is shadowing a qualified mechanic, he understands what the supervisor is actually doing and he can actually ask the relevant questions as the student moves around with him.

During the observation it was noted that only a handful of students had the ability to identify the parts of the engine or the vehicle but when questioned about the part regarding their functions, the students could not respond. There could be many reasons for this, students are just not interested in learning more than the name of the part, students were learning the part names on their own, during observation it was noted that the students were not attended to by the lecturer so when they needed to know the name of the part they would go to the board and identify the name of the part.

Interviewer: “What kind of practical experience do you think is important for the students to have in the course in order to be ready for the workplace? In other words when will the student have the ability to integrate propositional knowledge and practical knowledge and apply themselves to the working environment?”

Lecturer: “Hands on, got to have hands on experience, working with tools, physically stripping down units, not so much removing the units but stripping down units and when I say stripping down, taking diffs, gearboxes pulling them apart and reassembling them.”

Although much of these activities are carried out in the NCV ARM workshop, the students either watch the lecturer carry out the activity or are only able to complete the task once due to time constraints or lack of resources.

The observation showed that many of the students seemed unable to make a connection between the theoretical knowledge and the practical knowledge. This was identified when the lecturer would discuss a concept and demonstrate where possible, however when the lecturer questioned students immediately after the discussion, students were unable to answer. It seemed as if students could not make the connection between the theoretical knowledge and practical knowledge, or perhaps lacked the confidence and language competence to answer.

Lecturer feedback

In many instances the lecturer did not make the answer explicit to the student. Thus if the student made the same mistake again he would not be able to rectify it due to the fact that he doesn’t know if he is right or not. There were times when the students were left alone and had to figure out for themselves what was right and wrong.

When the students answered incorrectly, the lecturer would then ask the next student and when that student responded the lecturer would not accept or reject the answer. The students were therefore not informed whether the answer was correct or not or what the answer was at all.

TIME

The ISAT is a component that requires the application and integration of propositional and practical knowledge in order for the student to carry out the tasks required by the ISAT document. This idea is reiterated by Rauner (2007) who states that propositional and practical knowledge are required during work process knowledge, the students need to remember what was learnt in order to apply themselves to the task on hand.

There are many tasks that need to be completed prior to a student starting the ISAT. "The syllabus should be at least ninety percent (90%) complete in order for a student to be ready to carry out the ISAT. The ISAT is basically a student completing the practical with the knowledge that he has gained throughout the year," said the NCV ARM lecturer.

His concern with the ISAT is the number of components that have to be completed per student within a certain time period. The NCV ARM lecturer stated;

> "I remember when I was doing my . . . technical high school days we had to do practicals as well and we got a small little task of adjusting valve clearances on a motor car. The motor was lying there we had to physically go and adjust the valve clearances. After I was finished they would clear the valve clearances and the next person would come in. This activity took not more than half an hour. The following was observed and asked by my lecturer; can we work with spanners, do you know what you are talking about, do you understand what valve clearances are, do you get the right feel of the fuel inductor? Now, we giving the guy a full service to do on a motor vehicle, he's not a qualified motor mechanic, he's got one and a half weeks experience compared to an apprentice. The ISAT is just too complex and far too long for a level two student."

It is important to take note that although the curriculum has changed the notional hours of learning have remained at two hundred for the course.

Regarding the research question: what is the relationship between propositional knowledge and practical knowledge in the teaching of the NCV ARM module (the enacted curriculum), it is clear that in order for the student to complete the main tasks of the ARM module they would have to integrate both the propositional and practical knowledge in order to apply themselves to the practical tasks.

During the interview the lecturer noted that the practical component should be given more priority to the NCV ARM. *"The NCV definitely requires more practical time, in the workshop. The NCV was created in order to provide the student with a more practical qualification however the NCV in practice is dominated by theory."*

The lecturer stated that an apprentice does more or less forty five weeks of practicals over three years, whereas an NCV student only does about thirteen and a half weeks of practical over a three year period. According to the lecturer, thirteen and a half weeks is not going to make anybody a motor mechanic. *"When I say thirteen and a half weeks, if we take the hours that we working now and a sixty percent of the practical time associated to it, it doesn't give you much time."* The practical component exposes the students and shows them basically what is out there and what they should be doing, however it's not enough time for them to practically learn the trade as such from a practical point of view.

From a practical point of view, it will expose the student to what is out there for a motor mechanic. It's going to give him the necessary ability to understand people in the workshop but it's not going to give him enough exposure to the actual practical work itself. That is where he is going to be a learner to the trade and this will be achieved by being in the workshop, stated the lecturer.

"The problem once again is that the time in NCV ARM workshop is barely enough, the time must be extended in order to achieve as much learning as possible and you can't reduce the theory component because the theory component is a requirement," according to the lecturer.

This is somewhat of a contradictory comment due to the point that during the class time there are huge chunks of time that are lost, yet the lecturer still says more time is required.

With the practical component, there is not much time to be thorough. The students are basically exposed to a short period of time, which is definitely not enough to complete practical activities per student. The students basically look at it, browse and move on. The allocated time to the practical is not of real benefit to a student.

RESOURCES

The lecturer noted that "When lecturing NCV ARM you have to integrate both the practical and the theory components. However, one of the major hindrances to this would be time and resources. Although, this is best practice it is not always carried out".

One of the poorest elements in this TVET campusis that of resources, there are far too many students are far too few resources. The students do not get to use all equipment and machinery due to the few numbers that are available. This implies that the students are not exposed enough to the equipment and machinery that they should be exposed to.

CHAPTER SIX

THE EXPERIENCED NCV ARM CURRICULUM

6.1 INTRODUCTION

In chapter four, the discussion was based on the intended curriculum which focused on a curriculum analysis of the NCV ARM Level two curriculum documents. Chapter five was centred on the actual curriculum, that is the pedagogy and assessment which occurred in the classroom. In this chapter, the following question was addressed: how do NCV (Automotive Repair and Maintenance) students at Campus X experience the curriculum?

The emphasis in this chapter is the way in which the students experienced the curriculum. What were their feelings regarding the curriculum itself and the way in which it was carried out?

The above research question is addressed in this chapter using data collected from two focus groups. I started off with a discussion regarding focus groups, then discussed the themes that emerged from the data collected, I continued thereafter to give a summary of chapter six and ended with a discussion around the focus groups.

6.2 FOCUS GROUPS

A focus group is a form of a group interview. It does not rely on a back and forth dialogue between the interviewer and the group but rather on the communication between the group members who deliberate on a topic provided for by the researcher, yielding a combined rather than a single view (Morgan, 1988).

Morgan (1988) suggests that one group is insufficient, as I will be unable to know whether the outcome is unique to the behaviour of the group. The focus group chosen for this particular

study was for the following simple reasons: I would be able to collect qualitative data, data collection would be quick and cost effective and encouraging groups rather than individuals to voice their opinions.

The main purpose was to be able to draw upon the respondents' attitudes, feelings, beliefs, experiences and reactions. These attitudes, feelings and beliefs may have not been revealed as much as compared to that of a one-on-one interview however more information was likely to be gained from a social gathering. Respondents tend to be more at ease when they are in a group rather than having the spotlight on them alone. Focus groups provoke a multiplicity of views within a group context (Liebenberg, 2012). This focus group enabled me to gain a larger amount of information in a shorter space of time.

The focus groups were made up of NCV ARM Level two students from Campus X. The groups consisted of five students each. The students were selected for the two focus groups based on their test one results. The students all consented to participating in the focus groups. They were reminded that should they not be happy during any part of the focus group they had the option of exiting the focus group.

There were forty five students that wrote their compulsory test one *(Appendix 20 and 21 show the test and marking guideline used to determine the range of students)*. The test was of a theoretical nature since term one of the year starts with theory foundation. From the group of forty five students, five students with the highest marks, where students scored sixty eight percent and above, were chosen and five students with an average mark of fifty five percent and below were chosen.

Group one consisted of the top five students from test one and focus group two consisted of the five average students from test one. The focus groups were not strict and formal but rather casual and comfortable so as to allow the students to be confident in that environment to speak freely. This was my intention here to ensure that a discussion ensued rather than an interview. This would assist the process whereby students would be more comfortable talking amongst themselves compared to that of a question and answer session with me.

There were three females and two males in both groups respectively and the students ranged from sixteen years to twenty years of age. Five students had passed grade eleven, four had

passed grade ten and just one had only reached grade nine during their formal schooling. All the students were of the African race. It was interesting that seven of the ten students have some sort of experience in the automotive field, indicating that they did work with uncles, friends, etc in the informal automotive workshops that they ran. It was also interesting to take note that the average learners had no experience in the ARM field.

Groups	Name	Gender	Age	Last grade passed	Race	Actual mark	Experience in the ARM field	
							Yes	No
Group One	Andiswa	Female	19	10	Black	80%		✓
	Amanda	Female	19	10	Black	75%	✓	
	Jimmy	Male	22	10	Black	68%	✓	
	Nosipho	Female	20	11	Black	70%		✓
	Thulani	Male	24	11	Black	68%		✓
Group Two	Ben	Male	16	9	Black	55%		✓
	Buyi	Female	20	11	Black	50%		✓
	Siyabonga	Male	21	11	Black	53%		✓
	Lindo	Female	20	11	Black	54%		✓
	Gugu	Female	20	10	Black	52%		✓

TABLE 21: BIOGRAPHICAL DETAILS OF STUDENTS THAT PARTICIPATED IN THE FOCUS GROUPS

I began with a brief introduction of the research being undertaken and the purpose thereof to the groups respectively. I explained the focus group process, issues of confidentiality and that anything that they said would be kept confidential. The student's names would not be revealed unless permission was granted from them. Students were informed that should they feel uncomfortable at any point during the focus group discussion, they were not forced to remain and had the option to leave when they wanted.

Five students were requested to join focus group one. Focus group one began with a brief outline of what the focus group was about and what the purpose of the research was. Students were made aware that they did not have to answer any questions that they felt uncomfortable with and had the option to leave at any point if they did not want to participate. They were told that the research will be based on the ARM lectures and the way in which they were carried out. I explained the demographic document that they were asked to complete. It was made clear that this was for my use and will not be published in any manner what so ever, however should the need arise for publication, the students would be asked for their consent. The group was very energetic, helpful and willing to answer questions as best as they could.

The error made by me in this focus group session was that the students were not engaged in general conversation at the beginning and this was negative in so that the students seemed to remain tense and rigid with the answers. I started the questions off immediately and this did not allow the students to become comfortable and relaxed in the focus group. However, as time went on during the discussion of the focus group the students' nervousness tended to wear off and the conversation erupted. I would have liked to start off with a more general conversation to set the scene for the focus group.

6.3 THEMES THAT HAVE EMERGED FROM BOTH THE FOCUS GROUPS

6.3.1 STUDENTS MOTIVATION FOR STUDYING ARM

Groups	No.	Registered for interest	Registered for other reasons
Group One	Andiswa	✓	
	Amanda	✓	
	Jimmy	✓	
	Nosipho		✓
	Thulani		✓
Group Two	Ben	✓	
	Buyi		✓
	Siyabonga	✓	
	Lindo		✓
	Gugu		✓

TABLE 22: TABLE SHOWS THOSE STUDENTS THAT REGISTERED FOR INTEREST OR OTHERWISE FOR THE NCV ARM LEVEL TWO AS PER THE FOCUS GROUP

I asked the students why they were interested in joining the NCV ARM program. There were various responses from students. Andiswa* and Amanda* both said that it was their dream to work with cars because of the passion they had for vehicles. Ben*, Siyabonga* and Jimmy* stated they enjoyed working with the tools of the trade and working their hands Siyabonga* continued that he worked with his uncle in his informal automotive repair shop and that is where his passion was instilled.

Jacob decided to study NCV electrical engineering because he had experience in the field and was introduced by his uncle to this field which he began to love(Powell & Mc Grath, 2013) (Powell & Mc Grath, 2013) (Powell & Mc Grath, 2013) (Powell & Mc Grath, 2013) (Powell & Mc Grath, 2013).

During this discussion it was noted that at first when students were asked this question the response was clear that the intention was to join the NCV ARM program. However, when asked again and reassured that their personal information would remain confidential, five out of the ten students stated that they did not want to pursue a career in NCV ARM. Gugu* and Buyi* wanted to pursue a career in Electrical engineering, Lindo* wanted to further her studies in Education and development, Nosipho* wanted to become a lawyer and Thulani* was forced to come to Campus X to study, he said that he wanted to take a gap year and hadn't decided where he was headed yet.

The dreams of these five students could not be followed due to extenuating circumstances, where all students in the focus group did not meet the requirements in other institutions or have the finances to study elsewhere, or just could not afford to travel every day and so forth. After joining the NCV ARM students began enjoying the program and became interested in pursuing a career in the automotive field although it was a negative experience in the beginning, so the future did not seem so bleak anymore.

The students in this study were very undecided about what they wanted to study, which is different to the findings by Harriram (2001) who stated that her students were very confident in choosing haircare and cosmetology..

6.3.2 PREFERENCE FOR PRACTICAL ACTIVITIES

Groups	No.	Preferred practical	Preferred theoretical
Group One	Andiswa	✓	✓
	Amanda	✓	
	Jimmy	✓	
	Nosipho	✓	
	Thulani	✓	
Group Two	Ben	✓	
	Buyi	✓	
	Siyabonga	✓	
	Lindo	✓	
	Gugu	✓	

TABLE 23: STUDENTS THAT PREFERRED PRACTICAL COMPARED TO THEORETICAL KNOWLEDGE WITHIN THE FOCUS GROUP

When starting this section of the focus group students were asked what they understood by the term practical. Thulani* stated that it was something that you did with your hands, another student Buyi* said that it is taking the knowledge and ideas that you have and apply it using our hands, a third student Nosipho* said you do not understand what to do until you carry out the activity.

An interesting point to take note of was that only Andiswa* preferred both the practical and theoretical knowledge whereas the rest of the students preferred only practical knowledge. They enjoyed working with their hands and carrying out activities rather than reading or writing.

Andiswa and Ben said that they really enjoyed the practical activities like stripping and assembling engines and enjoyed the way in which the teacher conducted the lessons. They said that the lecturer would read the section from the textbook, explain the section in his own words and then he would take them around the workshop showing them the respective parts from that particular section.

At a study conducted at Cato Manor Technical College by Harriram (2001, p. 58) students echoed the above statements regarding their prefernce for practical work. The following was stated:

"It is hands-on work. I work with people and I do what I know best. It is exciting. I perform better with practical. "

"We learn more by doing practical. "

"Learn more in practical. "

"I find practicals to be informative, exciting and rewarding. "

Amanda, Lindo and Siyabonga agreed and said they enjoyed the workshop environment and carrying out activities rather than sitting and listening to the lecturer talking all the time. They enjoyed using their hands and moving around the workshop carrying out activities.

In a study carried out by Needham and Papier (2011) students found that the importance on practical skills very attractive, observing the benefit that they had over school students, especially with regard to work readiness and job prospects. This is a similar finding to that of (Powell & Mc Grath, 2013) who found that students were attracted by the college courses due to the mixture of theory and practical and the point that colleges were more 'hands on'compared to that of the school.

Nosipho and Thulani on the other hand enjoyed the theoretical side of the classroom. They enjoyed listening to the teacher and learning new aspects from the textbook. They also said that they appreciated the group work activities because it taught them how to work together, how to be leaders and also how to be followers.

It is quite clear that more students preferred the practical knowledge compared to that of the theoretical knowledge. There were a few that enjoyed the class discussions.

Practical knowledge assists the student in obtaining the precise procedures that become the tools of their ARM trade. There are some aspects that can only be learnt through doing and experiencing something.

As stated in earlier chapters there are twelve topics in the NCV ARM Level two syllabus, all twelve topics had been covered at the time of conducting the focus groups. The focus groups were conducted in the first week of August and at this part of the year the lecturers are rounding up the syllabus due to ISAT's which will be conducted toward the end of August and trial examinations which will begin mid-September. Once ISAT's begin, the students go

into the workshops on a more or less full time basis and they do not attend theory classes. This is also the reason why students could state whether they preferred practical or propositional knowledge and give feedback regarding the classroom activities.

TABLE 24: TOPICS THAT WERE COVERED BEFORE THE FOCUS GROUPS WERE CARRIED OUT

	Topic Number:	Topic:
Topics as per the NCV SAG ARM Level two	Topic One	Health and Safety
	Topic Two	Tools Applicable to the Auto Trade
	Topic Three	Measuring Equipment
	Topic Four	Vehicle Lifting Equipment
	Topic Five	Fundamentals of Engine Technology
	Topic Six	Bearings
	Topic Seven	Batteries
	Topic Eight	Lubrication Systems
	Topic Nine	Wheels and Tyres
	Topic Ten	Cooling Systems
	Topic Eleven	Lights and Automotive Electrical Systems
	Topic Twelve	Servicing a Vehicle

6.3.3 BARRIERS TO LEARNING

The two main barriers to learning that stood out were that of the lack of resources and time. The reason behind scarce resources and in some cases, time, was that of the large number of students that were enrolled.

6.3.3.1 Lack of resources

Although students were happy with the overall program and the way in which it was run, they noted that there were a few aspects that required changes. Buyi and Amanda were happy with the resources and were happy sharing machinery and equipment during the workshop lessons. However Jimmy, Siyabonga and Ben stated that more resources were required because they

did not get enough time to work on the equipment. Amanda said that there is a section in the textbook called wheel alignment but they did not have the equipment to carry out the task.

This was reiterated by a civil engineering student in another study who also mentioned the lack of practical application, saying that they learned about cranes but only ever saw them from far away (Needham & Papier, 2011).

Sharing of equipment and machinery will hinder students' learning processes. In a case where students get the opportunity to use the machinery and equipment and carry out the task, others will miss this opportunity due to the lack of time or equipment. As stated earlier most students prefer to carry out practical tasks rather than the theory, they said that they gained more knowledge by doing rather than reading.

6.3.3.2 Time

Students noted that there was not enough time for learning. This was a point also raised by the lecutrer. However, if students did try to make effort to come to class on time, it would help the situation. This is something that the students must learn due to the point that when they are employed, the employer will not condone late coming because s/he will be losing out on production time.

The curriculum is theory dense and if the time is not well used the lecturer will not be able to get through all the topics. Instructional time is lost due to student and / or lecturer late coming, and time is not well used during the class time. Time management plays a big part in gaining maximum learning time. Although students didn't have a high rate of absenteeism they did have however a habit of late coming in the morning and returning late to class after the breaks, which has been noted in other studies (Powell & Mc Grath, 2013).

6.4 DISCUSSION

The focus group enabled me to gauge what the students experienced and how their experiences differed or were similar between the groups. The biggest difference that was noticed between the two groups is that in group one at least three students had experience in the automotive industry whereas in group two, the average learners, none of the students had any experience in the automotive industry. An obvious similarity was that of age, as most

students were in the twenty year old bracket. Nine out of ten students preferred practical tasks only and one student, Andiswa, preferred both the theory and practical tasks.

There were three main themes that emerged from the focus groups: motivation for studying ARM; preference for practical activities and barriers to learning. Five out of the ten students registered with the intention to study NCV ARM and had some background knowledge regarding automotive industry whether they have worked in the informal workshop of their uncle or assisted in the community. These students were motivated from the beginning to carry out this course. However the other five students wanted to study other courses but due to reasons such as finances, or other courses being full they had no choice but to join the NCV ARM. Students were motivated to study no matter what course was handed to them. As time went on, the latter five students enjoyed the NCV ARM and continued working hard to complete the qualification.

According to the focus group discussions both groups preferred practical knowledge rather than theoretical knowledge. Focus group one and two were in different classes and during the focus group discussion it emerged that focus group one carried out more practical activity than focus group two. For some reason or the other the lecturer decided that group two required more focus on the theoretical knowledge rather than the practical knowledge, this emerged from the lecturer interview as well, where the lecturer stated that in some instances some groups require more attention in the theoretical knowledge area.

Group one from class group (A) was satisfied with the resources that were in the workshop and had no problems during their class sessions. However, the second focus group which was in class group (B) said they preferred more resources as they did not get enough time to use the equipment. A major factor that was mentioned by both the focus groups was that there was not enough time in the workshop for carrying out practical activities.

6.5 CONCLUSION

This chapter was based on the focus groups to generate data regarding the students' experiences of the NCV ARM level two course. Regarding motivation, only five of the students from both the focus groups registered for interest, but the other five eventually accepted the course and gave it their best. With regard to preference for practical learning,

nine out of ten preferred the practical tasks only and one student preferred both the practical and theoretical aspects of the course. Students noted that the two main learning barriers were time and sharing of equipment.

CHAPTER SEVEN

DISCUSSION AND CONCLUSION

7.1 INTRODUCTION

This chapter is a synthesises the findings in order to answer the research questions:

What is the relationship between the propositional knowledge and practical knowledge in the official curriculum documents? (i.e. the Subject and Assessment Guidelines of the Automotive Repair and Maintenance Curriculum).

What is the relationship between propositional and practical knowledge in the teaching of the NCV Automotive Repair and Maintenance module? (i.e. the enacted curriculum).

How do NCV (Automotive Repair and Maintenance) students at Campus X experience the theoretical and practical component of the curriculum? (i.e. the experienced curriculum).

I then discuss the relationships between the three levels of curriculum i.e., official, enacted and experienced curriculum and the extent to which propositional and practical knowledge is emphasised. Discussions regarding the data collected will be made. Further research ideas and questions will be presented.

7.2 RESEARCH QUESTION 1: WHAT IS THE RELATIONSHIP BETWEEN THE PROPOSITIONAL KNOWLEDGE AND PRACTICAL KNOWLEDGE IN THE OFFICIAL CURRICULUM DOCUMENTS? (I.E. THE SUBJECT AND ASSESSMENT GUIDELINES OF THE AUTOMOTIVE REPAIR AND MAINTENANCE CURRICULUM)

This question was analysed in chapter four of my thesis and was based on the intended curriculum. There were three types of curriculum that were discussed in this chapter from Porter (2004) that of the official curriculum, intended curriculum and the experienced curriculum.

In order to answer this question an analysis of the SAG was carried out to determine the extent to which the learning outcomes required propositional knowledge, practical knowledge and work process knowledge.

The NCV was introduced as a course that was more 'hands on' and consisted of more practical knowledge. The main aim of replacing the NATED courses with that of the NCV courses was to update the curriculum and introduce more practical knowledge in the courses being offered.

The analysis of the SAG shows there is indeed the introduction of practical knowledge in the NCV. Table 30 shows that practical knowledge has been introduced in the NCV course however, the theoretical knowledge still dominates the course.

	Topic Number:	Topic:	Knowledge that dominated in topic
Topics as per the NCV SAG ARM Level two	Topic One	Health and Safety	Theoretical knowledge
	Topic Two	Tools Applicable to the Auto Trade	Work process knowledge
	Topic Three	Measuring Equipment	Theoretical knowledge
	Topic Four	Vehicle Lifting Equipment	Practical knowledge
	Topic Five	Fundamentals of Engine Technology	Theoretical knowledge
	Topic Six	Bearings	Theoretical knowledge
	Topic Seven	Batteries	Work process knowledge
	Topic Eight	Lubrication Systems	Theoretical knowledge
	Topic Nine	Wheels and Tyres	Theoretical knowledge
	Topic Ten	Cooling Systems	Theoretical knowledge
	Topic Eleven	Lights and Automotive Electrical Systems	Practical knowledge
	Topic Twelve	Servicing a Vehicle	Practical knowledge

This defeats the main aim of introducing NCV, which was for more practical knowledge to be introduced into the courses. Three out of the twelve topics below consists mainly of practical knowledge, a majority of seven out of the twelve is dominated by propositional knowledge and two out of twelve topics contain work process knowledge.

According to Table 30, propositional knowledge appears in seven of the twelve topics which are fifty eight percent of the syllabus whereas practical knowledge is twenty five percent and work process knowledge is a meagre seventeen percent. It must be taken note that the above table shows that although certain knowledge dominates in certain chapters this however does not take away the point that the other types of knowledge do not exist. For example, Topic nine is wheels and tyres and consists mainly of theoretical knowledge, however this does not mean that practical knowledge and work process knowledge do not exist within the learning outcomes.

7.3 RESEARCH QUESTION 2: WHAT IS THE RELATIONSHIP BETWEEN PROPOSITIONAL AND PRACTICAL KNOWLEDGE IN THE TEACHING OF THE NCV AUTOMOTIVE REPAIR AND MAINTENANCE MODULE? (I.E. THE ENACTED CURRICULUM)

This research question was answered based on the semi-structured interview carried out with the NCV ARM lecturer and the non-participant observation over five days in the classroom / workshop.

DAY	TOPIC COVERED IN THE NCV TEXTBOOK	HOURS TAUGHT	KNOWLEDGE FOCUS
ONE	**TOPIC 10**: Cooling systems	2	Propositional knowledge
TWO	TOPIC 1 - 12: ISAT	2	Practical knowledge and work process knowledge
THREE	**TOPIC 12**: Stripping an engine	2	50% propositional knowledge and 50% practical knowledge
FOUR	**TOPIC 4**: Engine assembly	2	50% propositional knowledge and 50% practical knowledge
FIVE	**TOPIC 4 & TOPIC 5**: Vehicle lifting equipment & Engine assembly	2	Practical knowledge

TABLE 25: BASIC OUTLINE OF THE FIVE DAYS OF OBSERVATION THAT TOOK PLACE

The table above gives a basic outline of the five days of observation that took place in the workshop and or classroom setting. The observation was carried out by me as an non-participant observer. Each lesson was two hours long. It must be taken note that although on each day a topic is specified, this topic was only the major section discussed during that lesson, the lecturer did indeed bring in concepts from previous topics or concepts that may be introduced later in the year.

7.3.1 DAY ONE OF NON-PARTICIPANT OBSERVATION

On day one of the observation the lecturer focused the lesson on topic ten which dealt with cooling systems. Here the lecturer, for example, explained what a radiator is to the students, he then told them the functions of a radiator and he then continued to find a radiator in the workshop which he showed to the students and explained the above once again. However it

was noticed that students could not answer questions related to the concept discussed. For e.g. if the lecturer asked the same question in different ways students were not able to comprehend what was said. The lecturer also did not make an attempt to make it easy for the students to understand the questions. If they didn't understand he simply moved on to the next set of work. It was also noticed that the lecturer did not correct the students or confirm whether their answers where correct or not. This lesson was dominated by propositional knowledge.

7.3.2 DAY TWO OF NON-PARTICIPANT OBSERVATION

Day two was the major practical component for the NCV ARM course, which was made up of servicing a vehicle. It was noted that the student carried out each task independently of the lecturer and something to bear in mind was that due to time constraints not all tasks were completed. If a student could perform a task successfully without the assistance of the lecturer then the student was not questioned. However, where a student could not carry out a task the lecturer would question that student about the concept and slowly push the student to the correct answer or process.

In order to carry out the ISAT which is a practical activity, underpinning propositional knowledge was indeed required. Day two clearly focuses on work process knowledge where what was learnt in the classroom was to be applied in the workshop scenario.

TASK	PERCENTAGE	TYPE OF KNOWLEDGE ASSESSED
ISAT	35%	WORK PROCESS KNOWLEDGE
ESASS	50%	PROPOSITIONAL KNOWLEDGE
YEAR MARK	15%	PROPOSITIONAL KNOWLEDGE

TABLE 26: REQUIREMENT FOR THE YEAR FOR NCV STUDENTS

Table 32 that shows the three main tasks for the year that are required from a NCV Level two student to carry out. The ISAT, which was discussed earlier, is the major practical component consisting mainly of work process knowledge. The External Summative Assessment (ESASS) which is the final written examination and the year mark which is made up of two tests and two assignments.

Thus the assessed curriculum seems to focus on propositional knowledge (65% of the year mark) whereas the ISAT, which is regarded as a major practical component of the course carries (35%). Once again, this is contradicting the aim of implementing the NCV.

7.3.3 DAY THREE AND DAY FOUR OF NON-PARTICIPANT OBSERVATION

Day three and day four focused on practical knowledge. The main aim was stripping and reassembling an engine and in the process learning the different parts that make up the engine. Here students worked in groups and assisted each other. The boys stripped the engine while the girls would find out what is the name of the part and in some cases they would find the function of the part. In most cases they would think it sufficient to just find the name of the part. There was minimal assistance from the lecturer so whether the students learnt the function or not did not matter to them.

7.3.4 DAY FIVE OF NON-PARTICIPANT OBSERVATION

Day five was where the students would make use of a portable hoist and lift an engine of the ground or vehicle and place it in a different area. Students required propositional knowledge before carrying out this activity. They were required to learn how an engine is moved and what parts should be loosened and moved, etc before attempting to move the engine. The lecturer demonstrated the process and told the students what to do. He did not wait for the students to carry out the activity, or check if it was done the correct way but rather left as soon as his discussion was over.

Students began to attempt to move the engine but there were steps that they had forgotten, a student called for the lecturer and he returned and showed them the process once again, but once again did not wait to assist if there was a problem. This was a trial and error lesson for the students; this was similar to day three and day four where they had to figure out most of the process on their own.

There is indeed a relationship between the propositional knowledge and practical knowledge regarding the intended curriculum. There is indeed a relationship between the propositional knowledge and practical knowledge in these five days of classroom observation. It was noted that in order for the students to carry out certain practical activities they did indeed require

underpinning propositional knowledge. For example, during the ISAT, in order to inspect a vehicle they would require a certain list of criteria which would have been covered in topic 12 of the NCV ARM textbook.

7.4 HOW DO NCV (AUTOMOTIVE REPAIR AND MAINTENANCE) STUDENTS AT CAMPUS X EXPERIENCE THE CURRICULUM? (I.E. THE EXPERIENCED CURRICULUM)

The data in order to answer this research question was generated from two focus groups. There were three main themes that arose from the data; **Theme one**: students' motivation for studying the NCV ARM, **Theme two**: preference for practical knowledge and **Theme three**: barriers to learning.

7.4.1 STUDENTS' MOTIVATION FOR STUDYING THE NCV ARM

Five out of the ten students stated that they did not want a career in NCV ARM. These students wanted to do electrical engineering, education and development, law and one wanted just to take a gap year. However due to the background of the students and extenuating circumstances they were not at liberty to choose. They had to take what was available to them.

Students are sometimes forced to take this course due to the point that nothing else is available for them; there is a lack of funds available, close proximity from home which makes travelling easier and cheaper for them.

However, for those few that were really interested in pursuing the NCV ARM course was due to having a qualification and finding employment, they would continue working with an uncle or relative in the automotive field and some just enjoyed working in the automotive field.

7.4.2 PREFERENCE FOR PRACTICAL KNOWLEDGE

The majority of students preferred practical knowledge because they did not have to read from a textbook or write things down but rather they were carrying out the actual task regardless of whether they knew the propositional knowledge or not. Many students enjoyed working with their hands and moving around the workshop compared to sitting and listening to the lecturer for the entire lesson.

7.4.3 BARRIERS TO LEARNING

The final theme related to barriers that existed within the program according to the students. Three main ideas emerged here: lack of resources and sharing of equipment, the lecturer not providing clear feedback to students and the time factor regarding workshop time.

7.4.3.1 Lack of resources and sharing of equipment

A lack of resources leads to sharing of equipment. With regard to lack of resources students stated that there were sections in the textbook covering, for example, wheel alignment but there was no equipment for the lecturer to show them how it worked or what it even looked like. Sharing of equipment was a problem for some students since they believed that the time that they did eventually get was not enough.

7.4.3.2 Lecturer neither confirms nor denies the correct answer

The second barrier to learning was that of the lecturer who did not provide clear feedback on the correct answer. The students did not know whether their answers were correct or not. Some would consult their colleagues about the correct answer, or they would check their books and some would not even bother whether the answer was right or wrong. The students did not query this with the lecturer, they merely continued and adressed the questions they had with their fellow classmates rather than the lecturer.

7.4.3.3 Time factor

The third point was that of time regarding workshop activities, they stated that they knew that the NCV was brought in to be more practical than theoretical however their time in the workshop is just not enough.

Although both students and lecturer complained about the time not being sufficient, the time was rarely used to the best of their ability. The students would wonder around the classroom, talk while being taught, come late to class, etc. The lecturer did not manage the time in classin a very strucutred way as he would leave the students unattended, he would be busy with personal work and with idle chatter to the students. The students argued that if they had more time in the workshop then their results would be better.

7.5 RELATIONSHIP BETWEEN THE ACTUAL, ENACTED AND EXPERIENCED CURRICULUM

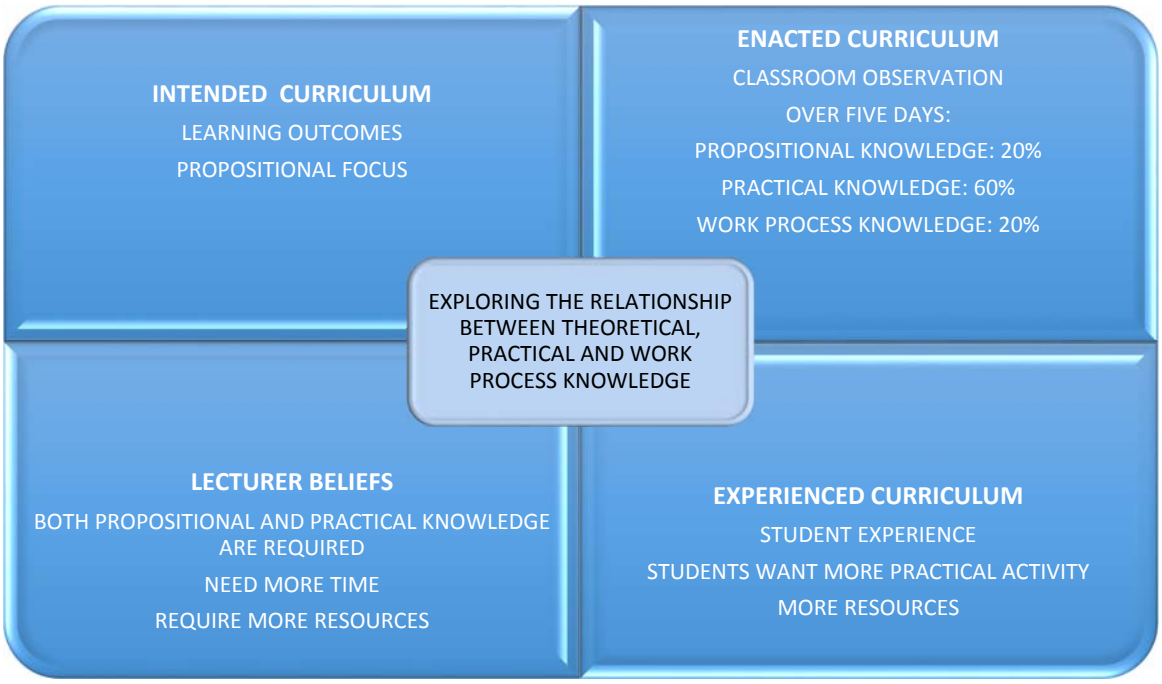


FIGURE 36: EXPLORING THE RELATIONSHIP BETWEEN THE ACTUAL, ENACTED AND EXPERIENCED CURRICULUM

The question here is did all three types of knowledge relate or rely on each other to function?

With regard to the actual curriculum, NCV ARM SAG, the focus of the learning outcomes was more on the theoretical knowledge or propositional knowledge rather than practical or work process knowledge.

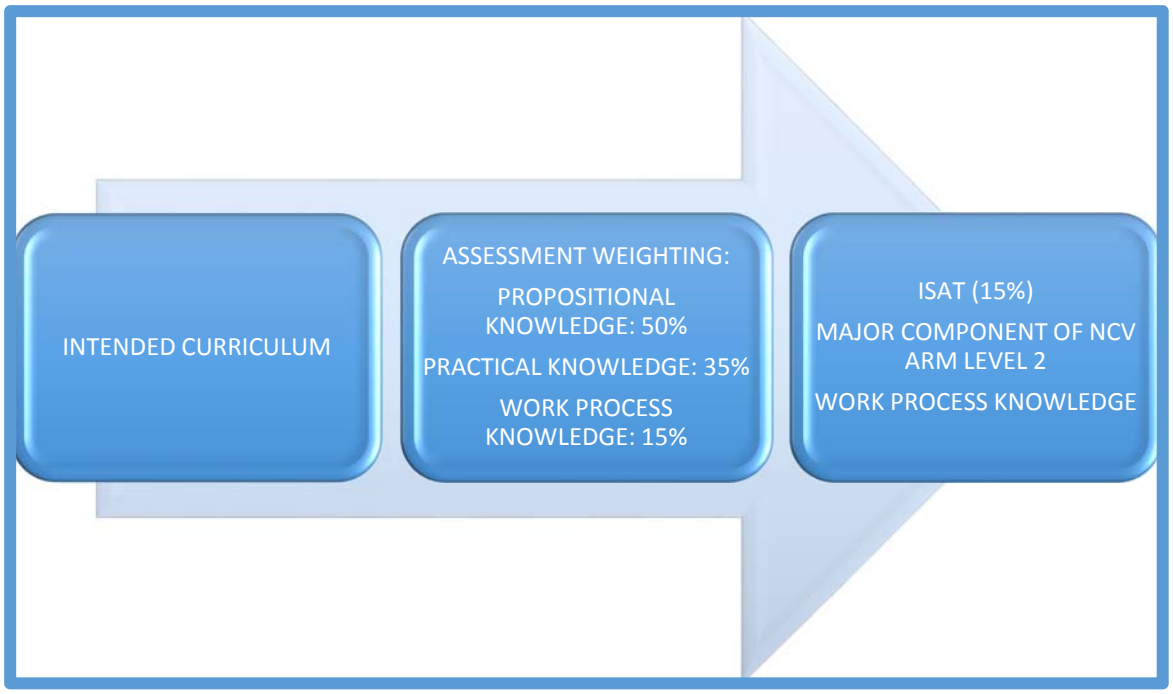


FIGURE 37: BREAKDOWN OF THE INTENDED CURRICULUM NCV ARM LEVEL TWO

Looking at Figure 38, the assessment of the intended curriculum shows that the assessment weighting focuses on propositional knowledge (50%), practical knowledge (35%) and work process knowledge (15%). However, it is important to note that although the ISAT is a major component of the NCV ARM level two, it carries a mere fifteen percent (15%) of the assessed curriculum.

Only five days of teaching were observed and thus cannot be generalised across the entire year. Of these five days, one day focused mostly on theory, one day on the ISAT where the focus was work process knowledge and three days on practical tasks. The lecturer believes that both the propositional and practical knowledge is required however the time allocated per week (four hours) is insufficient to lecture and allow time for practical activity.

The analysis of the intended learning outcomes of the curriculum showed that 55% of the learning outcomes required propositional knowledge, 38% required practical knowledge and 7% focused on work process knowledge. This is not a good match with the official assessment weightings as the ISAT tests work process knowledge which is weighted at 25%.

The enacted curriculum is carried out by the lecturer who teaches the curriculum using the of the textbook and supplementary notes where applicable. He also conducts demonstrations usng the engines to enable the students to understand certain concepts more clearly. Both students and the lecturer noted that there was too little time to focus sufficiently on developing work process knowledge.

7.6 LIMITATIONS OF THE RESEARCH

Wedekind (2008) states that there is only a handful of studies that scrutinise the multifaceted issue of knowledge in the technical and vocational field and how this is interpreted into curriculum. This made it difficult to find previous studies in this field.

The knowledge produced during this investigation will not be generalizable to other people or other settings. Due to the fact that every campus has their own set of students, who have their own perspectives and their setting will be different because their college will be different, their resources and facilities will also vary. The lecturer will also be different due to the fact that every lecturer has their own teaching methods and ways in which they handle time, students and resources. The fact that only five lessons were observed meant that the 'slice' of the enacted curriculum that was observed cannot be generalised to all the classroom teaching.

This was a very time consuming investigation due to the collection of the qualitative data, when taking into account the observation, focus groups and interviews that were held.

The study has produced in-depth, qualitative data that provides insight into the working of an NCV ARM program in South Africa. This adds to the limited body of knowledge that we have about TVET curriculum and pedagogy.

7.7 RECOMMENDATIONS

When conducting my research I found that the TVET College sector is an under researched education sector as there are numerous gaps that exist around the areas of curriculum development, lecturer qualification and motivation, time and resource management and the

relationship between practical and propositional knowledge. Extensive research needs to be done to further study the impact of curriculum studies and alike concepts in the TVET sector. The following are suggestions for further research:

The NCV and NATED curriculums need be anaysed in-depth and adjusted to ensure that the TVET sector and the workplace are aligned. It does not make sense to educate students in area A whereas the working sector requires area B.

A case study, with a larger sample, exploring the lecturers' qualifications and motivation would give an idea of how qualified lecturers are and are they a good 'fit' for that position. Findings of this research can serve as a base for a more nuanced and thick description of whether lecturers should be in that current position, should they be moved to a position that suits them better, should the TVET upgrade or upskill them, etc. This is extremely important to be completed in order to ensure that the students are gaining knowledge and skills to the maximum.

Finally, the impact of time and resource constraints on both the lecturer pedagogy and student learning and motivation could be further investigated.

7.8 CONCLUSION

The above are only a few recommendations that can be carried out in order to ensure that the TVET sector improves and adjusts to ensure maximum quality of education is cascaded to the students. Noteworthy development in the current adjustment to the TVET sector structure will provide an opportunity to transform the current disparate education and training system into an integrated system that addresses the needs of the learners, the society and the economy.

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APPENDICES

UNIVERSITY OF KWAZULU-NATAL
INYUVESI YAKWAZULU-NATALI

28 January 2014

Mrs Sanusha Chetty (201296624)
School of Education
Pietermaritzburg Campus

Protocol reference number: HSS/1526/013M
Project title: Exploring the relationship between theory and practice in the NCV Automotive Repair and Maintenance course

Dear Mrs Chetty,

Full Approval – Expedited

In response to your application dated 02 December 2013, the Humanities & Social Sciences Research Ethics Committee has considered the abovementioned application and the protocol have been granted **FULL APPROVAL.**

Any alteration/s to the approved research protocol i.e. Questionnaire/Interview Schedule, Informed Consent Form, Title of the Project, Location of the Study, Research Approach and Methods must be reviewed and approved through the amendment/modification prior to its implementation. In case you have further queries, please quote the above reference number.

Please note: Research data should be securely stored in the discipline/department for a period of 5 years.

I take this opportunity of wishing you everything of the best with your study.

Yours faithfully

.....
Dr Shenuka Singh (Chair)

/ms

Cc Supervisor: Dr Carol Bertram
cc Academic Leader Research: Dr MN Davids
cc School Administrator: Mr Thoba Mthembu

Humanities & Social Sciences Research Ethics Committee
Dr Shenuka Singh (Chair)
Westville Campus, Govan Mbeki Building
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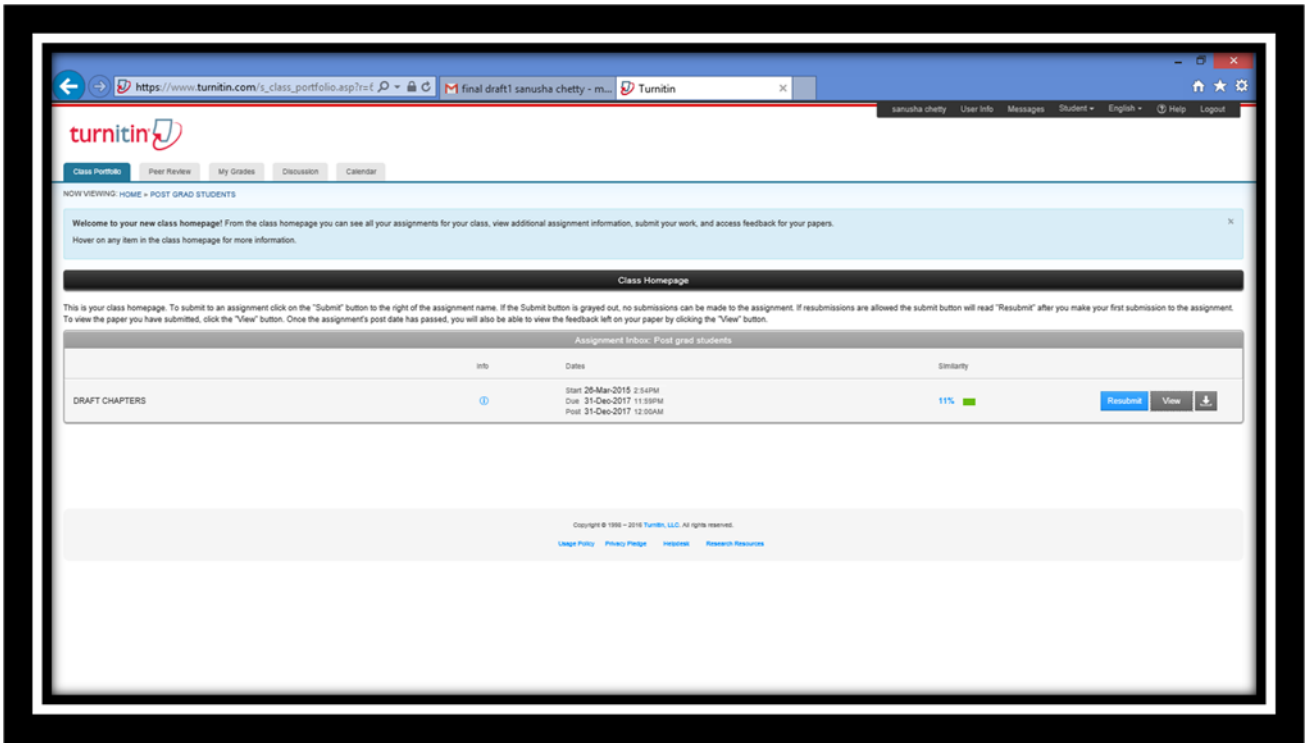
Telephone: +27 (0) 31 260 3587/8350/4557 **Facsimile:** +27 (0) 31 260 4609 **Email:** ximbap@ukzn.ac.za / snymanm@ukzn.ac.za / mohunp@ukzn.ac.za
Website: www.ukzn.ac.za

1910 - 2010
100 YEARS OF ACADEMIC EXCELLENCE

Founding Campuses: Edgewood Howard College Medical School Pietermaritzburg Westville

APPENDIX 1: ETHICAL CLEARANCE CERTIFICATE

APPENDIX 2: TURNITIN CERTIFICATE



UNIVERSITY OF KWAZULU-NATAL

Mr. [redacted]
Campus manager
surfilall-royr@ufetc.edu.za

11 November 2013

Dear Mr [redacted]

M.Ed research project on the NCV Automotive and Repair curriculum

Mrs Sanusha Chetty is a Masters student at the School of Education, and is embarking on a research project to understand the relationship between theoretical and practical knowledge within the Automotive and Repair NCV curriculum. This letter explains the purpose of the study, and requests your permission for her to conduct the study at the FET institution.

The purpose of the project is to explore and describe the ways in which theoretical and practical knowledge are emphasized in the NCV curriculum documents, and in the classroom teaching of the course. This will entail observing certain classes, interviewing the relevant lecturer and possibly also interviewing the students.

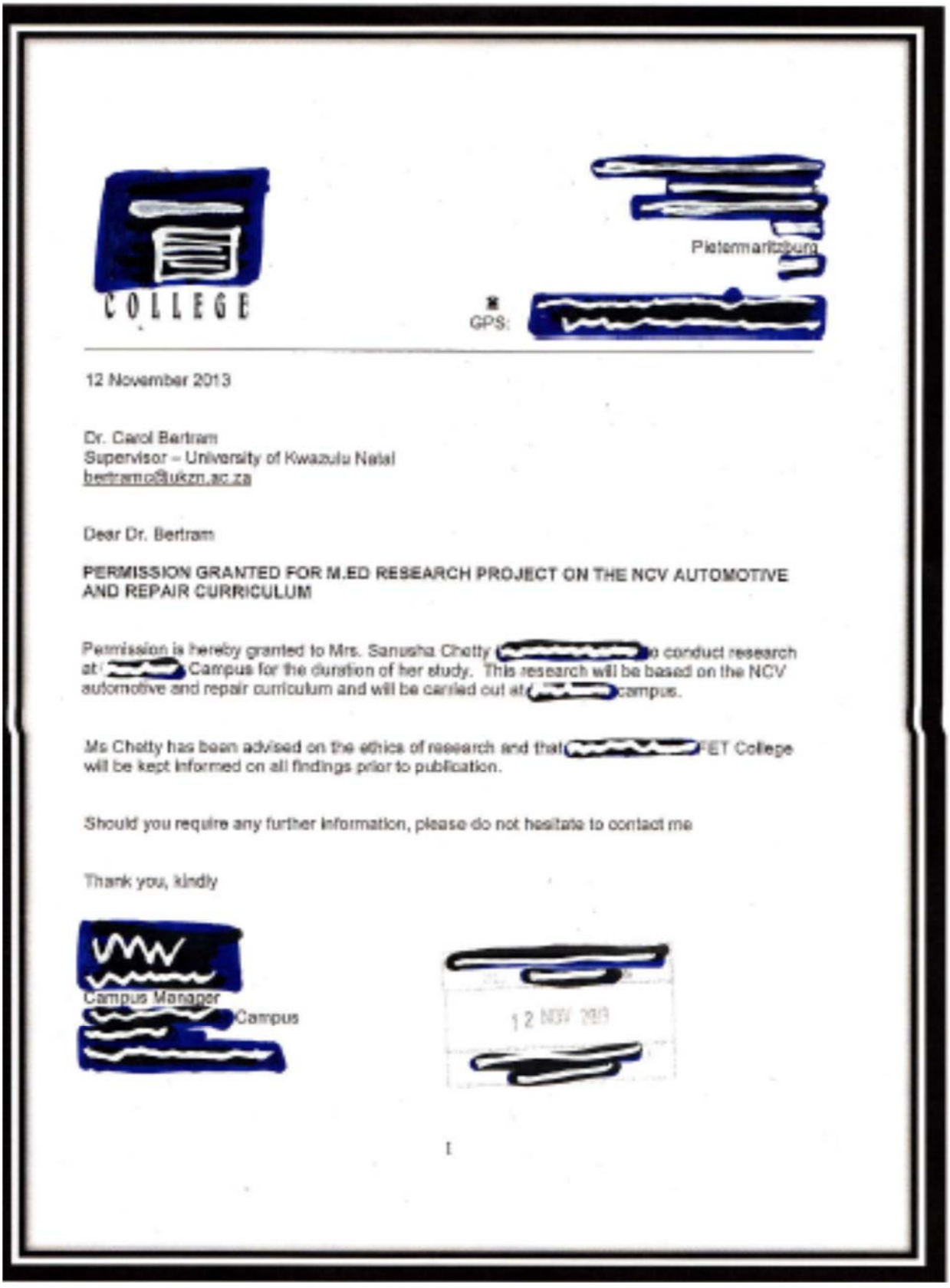
I am the supervisor of Mrs Chetty and should you want any more information on this study, please contact me on 033 260 5349/ 084 4079827. We would appreciate it if you could write a short letter indicating if you are willing for this study to take place in the institution.

Yours sincerely

Dr Carol Bertram
Senior Lecturer
School of Education
Pietermaritzburg

School of Education
Postal Address: Private Bag X01, Scottsville, 3209, South Africa
Telephone: +27 (0) 33 260 6206 Facsimile: +27 (0) 33 260 5080 Email: penumalp@ukzn.ac.za Website: www.ukzn.ac.za
Founding Campuses: Edgewood Howard College Medical School Pietermaritzburg Westville

APPENDIX 3: REQUEST FOR PERMISSION REQUESTED FROM CAMPUS MANAGER AT CAMPUS X TO CONDUCT RESEARCH



COLLEGE

[redacted]
Pietermaritzburg
GPS: [redacted]

12 November 2013

Dr. Carol Bertram
Supervisor – University of Kwazulu Natal
bertramc@ukzn.ac.za

Dear Dr. Bertram

PERMISSION GRANTED FOR M.ED RESEARCH PROJECT ON THE NCV AUTOMOTIVE AND REPAIR CURRICULUM

Permission is hereby granted to Mrs. Sanusha Chetty [redacted] to conduct research at [redacted] Campus for the duration of her study. This research will be based on the NCV automotive and repair curriculum and will be carried out at [redacted] campus.

Ms Chetty has been advised on the ethics of research and that [redacted] FET College will be kept informed on all findings prior to publication.

Should you require any further information, please do not hesitate to contact me

Thank you, kindly

[redacted]
Campus Manager
[redacted] Campus

[redacted]
12 NOV 2013
[redacted]

APPENDIX 4: PERMISSION GRANTED FROM CAMPUS MANAGER TO CARRY OUT RESEARCH AT CAMPUS X

UNIVERSITY OF
KWAZULU-NATAL
PIETERMARITZBURG CAMPUS

11 November 2013

Dear Mr [redacted]

M.Ed research project on the NCV Automotive and Repair curriculum

Mrs Sanusha Chetty is a Masters student at the School of Education, and is embarking on a research project to understand the relationship between theoretical and practical knowledge within the Automotive and Repair NCV curriculum. This letter explains the purpose of the study, and requests your permission for her to conduct the study in your classroom.

The purpose of the project is to explore and describe the ways in which theoretical and practical knowledge are emphasized in the NCV curriculum documents, and in the classroom teaching of the course. This will entail observing certain classes, interviewing you as the relevant lecturer and possibly also interviewing the students.

I am the supervisor of Mrs Chetty and should you want any more information on this study, please contact me on 033 260 5349/ 084 4079827. We would appreciate it if you could write a short letter indicating if you are willing for this study to take place in your classroom.

Yours sincerely

Dr Carol Bertram
Senior Lecturer
School of Education
Pietermaritzburg

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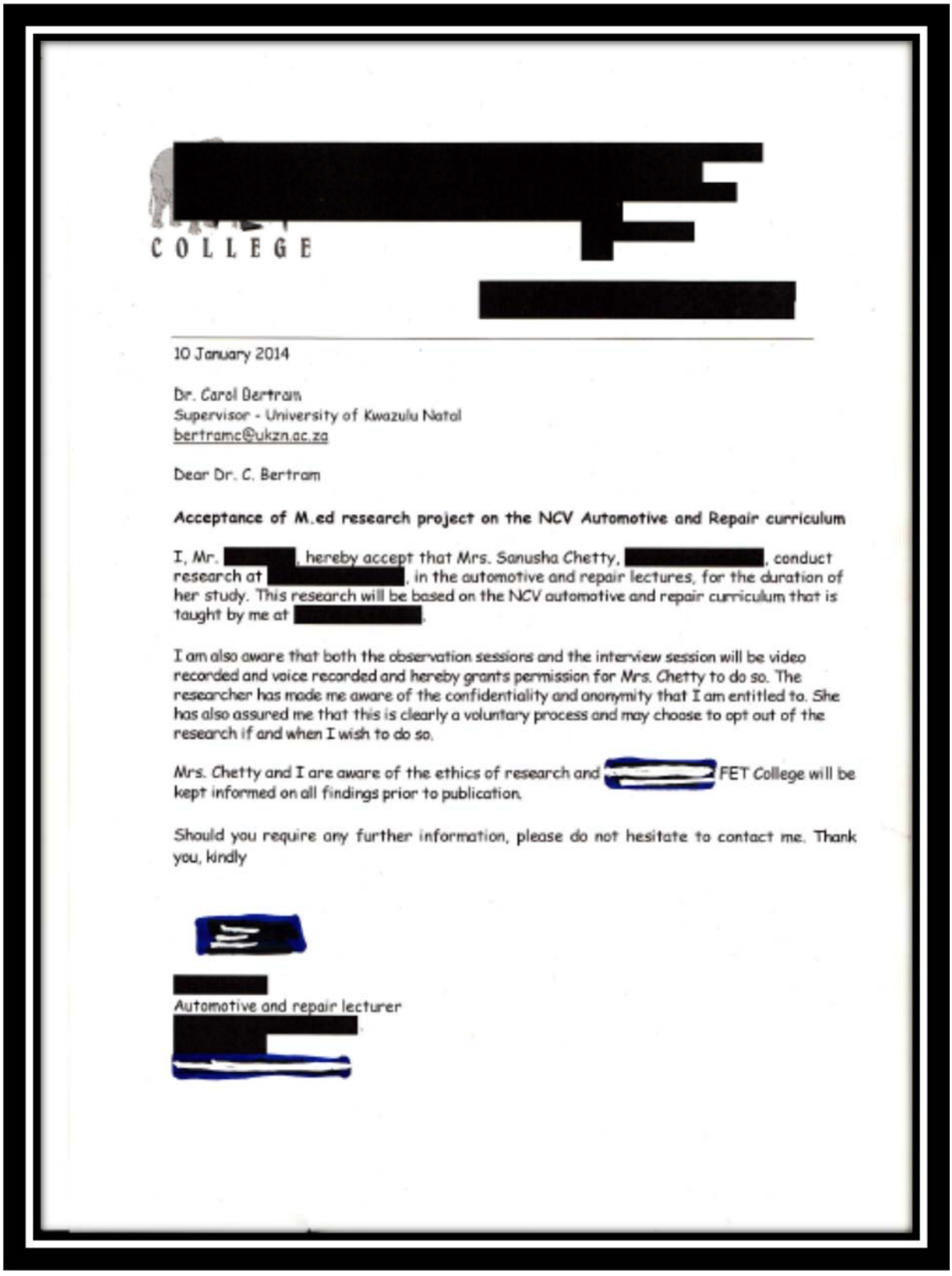
APPENDIX 5: REQUEST FROM NCV ARM LEVEL TWO LECTURER TO CONDUCT CLASSROOM OBSERVATION AND INTERVIEW AT CAMPUS X



[redacted]
COLLEGE
[redacted]

10 January 2014

Dr. Carol Bertram
Supervisor - University of Kwazulu Natal
bertramc@ukzn.ac.za

Dear Dr. C. Bertram

Acceptance of M.ed research project on the NCV Automotive and Repair curriculum

I, Mr. [redacted], hereby accept that Mrs. Sanusha Chetty, [redacted], conduct research at [redacted], in the automotive and repair lectures, for the duration of her study. This research will be based on the NCV automotive and repair curriculum that is taught by me at [redacted].

I am also aware that both the observation sessions and the interview session will be video recorded and voice recorded and hereby grants permission for Mrs. Chetty to do so. The researcher has made me aware of the confidentiality and anonymity that I am entitled to. She has also assured me that this is clearly a voluntary process and may choose to opt out of the research if and when I wish to do so.

Mrs. Chetty and I are aware of the ethics of research and [redacted] FET College will be kept informed on all findings prior to publication.

Should you require any further information, please do not hesitate to contact me. Thank you, kindly

[redacted]

[redacted]
Automotive and repair lecturer
[redacted]

APPENDIX 6: PERMISSION GRANTED FROM NCV ARM LEVEL TWO LECTURER AT CAMPUS X

The LOS from the SAG where the theoretical knowledge dominates the practical knowledge

LOS from Topic One of the SAG NCV ARM

LOs AS PER THE SAG ARM LEVEL TWO				
Topic Number	Topic	Learning Outcome Number	Learning Outcome	Coding
Topic One	Health and Safety	1.1	Distinguish between an accident and an incident	theoretical knowledge
Topic One	Health and Safety	1.1	Explain the influence of hazards such as temperature, chemical burns and electric shocks in an automotive workshop	theoretical knowledge
Topic One	Health and Safety	1.1	Identify factors that lead to an accident or incident.	theoretical knowledge
Topic One	Health and Safety	1.1	Describe basic methods of preventing accidents	theoretical knowledge
Topic One	Health and Safety	1.1	Explain the advantages of accident prevention	theoretical knowledge
Topic One	Health and Safety	1.2	Describe the advantages of good housekeeping in the workshop	theoretical knowledge
Topic One	Health and safety	1.2	Clean and store tools and equipment used in the correct places	Practical knowledge
Topic One	Health and Safety	1.2	Explain the importance of keeping records on accidents and incidents	theoretical knowledge
Topic One	Health and Safety	1.3	Describe the reasons for using colour coding in an automotive workshop	theoretical knowledge
Topic One	Health and safety	1.3	Identify colour coding and safety signs used in an automotive workshop	Practical knowledge
Topic One	Health and Safety	1.3	Explain the purpose of different safety signs	theoretical knowledge

LOs AS PER THE SAG ARM LEVEL TWO				
Topic Number	Topic	Learning Outcome Number	Learning Outcome	Coding
Topic One	Health and Safety	1.4	Explain the purpose of the Occupational Health and Safety Act (OHS)	theoretical knowledge
Topic One	Health and Safety	1.4	Identify the requirements of the Occupational Health and Safety Act (OHS) applicable to an automotive workshop	theoretical knowledge
Topic One	Health and Safety	1.4	Describe the duties, rights and liabilities of employers and employees according to the Occupational Health and Safety Act (OHS)	theoretical knowledge
Topic One	Health and Safety	1.5	Describe the causes of air pollution in an automotive workshop	theoretical knowledge
Topic One	Health and Safety	1.5	Identify various types of possible fires and describe how to extinguish them	theoretical knowledge
Topic One	Health and Safety	1.6	Identify and describe the function of PPE that must be worn in an automotive workshop	theoretical knowledge
Topic One	Health and Safety	1.6	Describe unsafe and/or dangerous objects and clothes unsuitable to wear in an automotive workshop	theoretical knowledge
Topic One	Health and Safety	1.6	Explain the importance of practising good personal hygiene in an automotive workshop	theoretical knowledge
Topic One	Health and Safety	1.6	Remove and replace bearings from a shaft	Practical knowledge
Topic One	Health and Safety	1.6	Dispose of all the waste materials, fluids, lubricants, filters and other rubbish according to safety, health and environmental procedures.	Practical knowledge
Topic One	Health and Safety	1.6	Clean all tools and equipment that were used and store them in their appropriate storage area according to workshop procedures.	Practical knowledge
Topic One	Health and Safety	1.6	Complete the required documents to record servicing activities	Practical knowledge

LOS from Topic Three of the NCV ARM SAG

LOs AS PER THE SAG ARM LEVEL TWO				
Topic Number	Topic	Learning Outcome Number	Learning Outcome	Coding
Topic Three	Measuring Equipment	3.1	Explain what is the metric system and list the most common System International (Department of Higher Education and Training & Department of Basic Education) units	theoretical knowledge
Topic Three	Measuring Equipment	3.1	Explain units of angular measurement	theoretical knowledge
Topic Three	Measuring Equipment	3.1	Explain and demonstrate the parallax error.	Work process knowledge
Topic Three	Measuring Equipment	3.1	Describe the influence of temperature on measurements.	theoretical knowledge
Topic Three	Measuring Equipment	3.1	Describe and apply general rules when using measuring equipment	Work process knowledge
Topic Three	Measuring Equipment	3.2	Identify and use measuring instruments and equipment to perform a range of measuring activities.	Work process knowledge

APPENDIX 8: LOS 3.1 - 3.2 AS PER NCV ARM SAG

LOs from Topic Five of the SAG NCV ARM

Los AS PER THE SAG ARM LEVEL TWO				
Topic Number	Topic	Learning Outcome Number	Learning Outcome	Coding
Topic Five	Fundamentals of Engine Technology	5.1	Identify the location/position of engine parts components and systems in a motor vehicle.	Practical knowledge
Topic Five	Fundamentals of Engine Technology	5.1	Describe the main functions of identified engine parts, components and systems in a motor vehicle	theoretical knowledge
Topic Five	Fundamentals of Engine Technology	5.2	Explain the process of converting reciprocating motion to rotating motion	theoretical knowledge
Topic Five	Fundamentals of Engine Technology	5.2	Explain the operation of a two stroke internal combustion engine	theoretical knowledge
Topic Five	Fundamentals of Engine Technology	5.2	Explain the operation of a four stroke internal combustion engine	theoretical knowledge
Topic Five	Fundamentals of Engine Technology	5.2	Explain the difference between a petrol and diesel engine	theoretical knowledge
Topic Five	Fundamentals of Engine Technology	5.2	Explain the power producing cycles of a rotary engine/Wankel engine	theoretical knowledge

APPENDIX 9: LOS 5.1 - 5.2 AS PER SAG NCV ARM

LOs from Topic Six of the SAG NCV ARM

LOs AS PER THE SAG ARM LEVEL TWO				
Topic Number	Topic	Learning Outcome Number	Learning Outcome	Coding
Topic Six	Bearings	6.1	Identify and describe types of bearings	theoretical knowledge
Topic Six	Bearings	6.1	Describe anti-friction bearings	theoretical knowledge
Topic Six	Bearings	6.1	Explain the various loads on anti-friction bearings	theoretical knowledge
Topic Six	Bearings	6.1	Explain the causes of bearing failures	theoretical knowledge
Topic Six	Bearings	6.2	Remove and replace bearings from a housing	Practical knowledge
Topic Six	Bearings	6.2	Remove and replace bearings from a shaft	Practical knowledge

APPENDIX 10: LOS 6.1 - 6.2 AS PER SAG NCV ARM

LOs from Topic Eight of the SAG NCV ARM

LOs AS PER THE SAG ARM LEVEL TWO				
Topic Number	Topic	Learning Outcome Number	Learning Outcome	Coding
Topic Eight	Lubrication Systems	8.1	Explain the concept 'friction'.	theoretical knowledge
Topic Eight	Lubrication Systems	8.1	Explain the function of lubrication.	theoretical knowledge
Topic Eight	Lubrication Systems	8.1	Compare hydrostatic lubrication with hydrodynamic lubrication.	theoretical knowledge
Topic Eight	Lubrication Systems	8.1	Explain the properties of lubrication oil.	theoretical knowledge
Topic Eight	Lubrication Systems	8.1	Explain the viscosity ratings of oil.	theoretical knowledge
Topic Eight	Lubrication Systems	8.1	Explain the role of oil additives in lubrication oil.	theoretical knowledge
Topic Eight	Lubrication Systems	8.1	Explain the classification of engine oils.	theoretical knowledge
Topic Eight	Lubrication Systems	8.1	Explain gear lubricants and their requirements.	theoretical knowledge
Topic Eight	Lubrication Systems	8.1	Explain lubrication grease.	theoretical knowledge
Topic Eight	Lubrication Systems	8.2	Identify various lubrication systems	theoretical knowledge
Topic Eight	Lubrication Systems	8.2	Identify various types of oil pumps	theoretical knowledge
Topic Eight	Lubrication Systems	8.2	Explain the function and operation of a pressure relief valve	theoretical knowledge
Topic Eight	Lubrication Systems	8.2	Explain the function and operation of an oil filter	theoretical knowledge
Topic Eight	Lubrication Systems	8.3	Explain why an engine oil leakage should be prevented	theoretical knowledge
Topic Eight	Lubrication Systems	8.3	Explain the functioning and operation of various oil seals	theoretical knowledge
Topic Eight	Lubrication Systems	8.3	Explain the need for crankcase ventilation	theoretical knowledge
Topic Eight	Lubrication Systems	8.3	Describe different crankcase ventilation systems	theoretical knowledge
Topic Eight	Lubrication Systems	8.3	Explain the function of a PVC valve	theoretical knowledge
Topic Eight	Lubrication Systems	8.3	Describe reasons for oil dilution and contamination	theoretical knowledge
Topic Eight	Lubrication Systems	8.3	Describe reasons for oil consumption in a vehicle	theoretical knowledge

LOS from Topic Nine of the SAG NCV ARM

LOs AS PER THE SAG ARM LEVEL TWO				
Topic Number	Topic	Learning Outcome Number	Learning Outcome	Coding
Topic Nine	Wheels and Tyres	9.1	Identify different types of vehicle wheel rims.	Practical knowledge
Topic Nine	Wheels and Tyres	9.1	Describe materials used for manufacturing vehicle wheel rims	theoretical knowledge
Topic Nine	Wheels and Tyres	9.1	Explain the function of wheel rims	theoretical knowledge
Topic Nine	Wheels and Tyres	9.2	Define terminology used when describing vehicle tyres	theoretical knowledge
Topic Nine	Wheels and Tyres	9.2	Identify and describe different types of tyres	theoretical knowledge
Topic Nine	Wheels and Tyres	9.2	Describe the construction of a vehicle tyre	theoretical knowledge
Topic Nine	Wheels and Tyres	9.2	Explain the function of vehicle tyres	theoretical knowledge
Topic Nine	Wheels and Tyres	9.2	Explain the proper care for vehicle tyres	theoretical knowledge
Topic Nine	Wheels and Tyres	9.2	Explain wearing patterns of tyres	theoretical knowledge
Topic Nine	Wheels and Tyres	9.3	Explain the safety requirements when removing, repairing and replacing a car tyre	theoretical knowledge
Topic Nine	Wheels and Tyres	9.3	Explain the operation of a pneumatic-electric operated tyre removal machine	theoretical knowledge
Topic Nine	Wheels and Tyres	9.3	Perform required preparations and remove the wheel from the car	Practical knowledge

Topic Nine	Wheels and Tyres	9.3	Use a tyre removal machine to remove the tyre from the rim	Practical knowledge
Topic Nine	Wheels and Tyres	9.3	Repair a tube type tyre and a tubeless tyre with the appropriate means	Practical knowledge
Topic Nine	Wheels and Tyres	9.3	Put the tyre back on the rim with the help of a tyre removal machine	Practical knowledge
Topic Nine	Wheels and Tyres	9.3	Replace/Fit the wheel to the car and tighten it according to factory specifications	Practical knowledge

APPENDIX 12: LOS 9.1 - 9.3 AS PER SAG NCV ARM

LOs AS PER THE SAG ARM LEVEL TWO				
Topic Number	Topic	Learning Outcome Number	Learning Outcome	Coding
Topic Ten	Cooling Systems	10.1	Explain the safety precautions when working on a vehicle cooling system	theoretical knowledge
Topic Ten	Cooling Systems	10.1	Distinguish between air cooled and water cooled systems in vehicles	theoretical knowledge
Topic Ten	Cooling Systems	10.1	Identify and explain types of water cooled systems	Work process knowledge
Topic Ten	Cooling Systems	10.2	Distinguish between 'down flow' and 'cross flow' radiators	Work process knowledge
Topic Ten	Cooling Systems	10.2	Describe the function and operation of radiator shutters	theoretical knowledge
Topic Ten	Cooling Systems	10.2	Explain the function of a radiator cap	theoretical knowledge
Topic Ten	Cooling Systems	10.2	Describe the operation of different types of thermostats	theoretical knowledge
Topic Ten	Cooling Systems	10.2	Explain the function and operation of a water pump	theoretical knowledge
Topic Ten	Cooling Systems	10.2	Explain the operation of various types of vehicle fans	theoretical knowledge
Topic Ten	Cooling Systems	10.3	Identify and explain the importance of wearing appropriate personal protective equipment when testing a cooling system	Work process knowledge
Topic Ten	Cooling Systems	10.3	Adhere to all safety precautions before commencing with a cooling system test	Practical knowledge
Topic Ten	Cooling Systems	10.3	Perform a radiator pressure test, pressure cap test and a thermostat test	Practical knowledge
Topic Ten	Cooling Systems	10.3	Inspect radiator hoses	Practical knowledge

LOs from Topic Ten of the SAG NCV ARM

APPENDIX 13: LOS 10.1 - 10.3 AS PER SAG NCV ARM

The LOs from the SAG where the practical knowledge dominates the theoretical knowledge

LOs from Topic Four of the SAG NCV ARM

LOs AS PER THE SAG ARM LEVEL TWO				
Topic Number	Topic	Learning Outcome Number	Learning Outcome	Coding
Topic Four	Vehicle Lifting Equipment	4.1	Identify and name different vehicle/automobile lifting equipment and tools	Work process knowledge
Topic Four	Vehicle Lifting Equipment	4.1	Describe the use of jacks and hoists	theoretical knowledge
Topic Four	Vehicle Lifting Equipment	4.1	Identify and describe the function of the various components of hoists	theoretical knowledge
Topic Four	Vehicle Lifting Equipment	4.1	Describe the necessary precautions to take before operating jacks and hoists	theoretical knowledge
Topic Four	Vehicle Lifting Equipment	4.2	Select correct lifting equipment according to the size and weight of the vehicle to be lifted.	Practical knowledge
Topic Four	Vehicle Lifting Equipment	4.2	Carry out precautionary measures before operating jacks and hoists	Practical knowledge
Topic Four	Vehicle Lifting Equipment	4.2	Operate two post and four post hoists correctly and safely.	Practical knowledge
Topic Four	Vehicle Lifting Equipment	4.2	Operate electrical lifting equipment correctly and safely	Practical knowledge
Topic Four	Vehicle Lifting Equipment	4.2	Operate hydraulic lifting equipment correctly and safely	Practical knowledge

APPENDIX 14: LOS 4.1 - 4.2 AS PER SAG NCV ARM

LOs from Topic Eleven of the SAG NCV ARM

LOs AS PER THE SAG ARM LEVEL TWO				
Topic Number	Topic	Learning Outcome Number	Learning Outcome	Coding
Topic Eleven	Lights and Automotive Electrical Systems	11.1	Identify and explain electrical symbols and circuits used in the automotive industry	Work process knowledge
Topic Eleven	Lights and Automotive Electrical Systems	11.1	Explain the concept 'induced electricity'	theoretical knowledge
Topic Eleven	Lights and Automotive Electrical Systems	11.1	Describe the principles of electricity applicable to automotive electrical circuits	theoretical knowledge
Topic Eleven	Lights and Automotive Electrical Systems	11.2	Describe different lighting systems on a vehicle/automobile	theoretical knowledge
Topic Eleven	Lights and Automotive Electrical Systems	11.2	Identify vehicle light components and explain their functions	Work process knowledge
Topic Eleven	Lights and Automotive Electrical Systems	11.3	Prepare the worksite and vehicle to perform headlight adjustment work activities	Practical knowledge
Topic Eleven	Lights and Automotive Electrical Systems	11.3	Ensure that appropriate tools, testing equipment and consumables needed for the adjustment of the headlights are at the workstation	Practical knowledge
Topic Eleven	Lights and Automotive Electrical Systems	11.3	Align the vehicle and beam testing equipment as per manufacturer's specifications	Practical knowledge
Topic Eleven	Lights and Automotive Electrical Systems	11.3	Adjust the headlights as per manufacturer's specifications and instructions	Practical knowledge
Topic Eleven	Lights and Automotive Electrical Systems	11.4	Explain the importance of applying manufacturer's specifications and procedures	theoretical knowledge

LOs AS PER THE SAG ARM LEVEL TWO				
Topic Number	Topic	Learning Outcome Number	Learning Outcome	Coding
			when replacing light components in a car	
Topic Eleven	Lights and Automotive Electrical Systems	11.4	Remove and replace light components	Practical knowledge
Topic Eleven	Lights and Automotive Electrical Systems	11.5	Explain the use of a digital multi-meter to measure voltage, current and resistance	theoretical knowledge
Topic Eleven	Lights and Automotive Electrical Systems	11.5	Explain the terms 'voltage drop, short circuit, rest current and open circuits'	theoretical knowledge
Topic Eleven	Lights and Automotive Electrical Systems	11.5	Systematically trace the cause of an open circuit or voltage drop in an electrical circuit of the car	Practical knowledge
Topic Eleven	Lights and Automotive Electrical Systems	11.5	Systematically trace the cause of a short circuit in an electrical circuit of the car.	Practical knowledge
Topic Eleven	Lights and Automotive Electrical Systems	11.5	Systematically trace the cause of high rest current on the electrical circuit of a car	Practical knowledge

APPENDIX 15: LOS 11.1 - 11.5 AS PER SAG NCV ARM

LOs from Topic Twelve of the SAG NCV ARM

LOs AS PER THE SAG ARM LEVEL TWO				
Topic Number	Topic	Learning Outcome Number	Learning Outcome	Coding
Topic Number 12	Servicing a vehicle	12.1	Obtain appropriate fluids, lubricants and parts to service a vehicle	Practical knowledge
Topic Number 12	Servicing a vehicle	12.1	Obtain appropriate tools and equipment needed for the service of a vehicle	Practical knowledge
Topic Number 12	Servicing a vehicle	12.1	Explain the safety rules and regulations e.g. the Occupational Health and Safety Act (Act 85 of 1993) and company policies and procedures.	Theoretical knowledge
Topic Number 12	Servicing a vehicle	12.1	Obtain appropriate personal protective equipment	Practical knowledge
Topic Number 12	Servicing a vehicle	12.1	Prepare work area and vehicle for a service	Practical knowledge
Topic Number 12	Servicing a vehicle	12.2	Inspect the vehicle interior such as seats, instrument panel, mirrors, controls, safety belts, carpets and upholstery	Practical knowledge
Topic Number 12	Servicing a vehicle	12.2	Inspect the vehicle exterior such as mirrors, windows, paintwork, door operation, body work, bonnet catches, locks and boot catches.	Practical knowledge
Topic Number 12	Servicing a vehicle	12.2	Inspect the wheels, tyres and spare wheel.	Practical knowledge
Topic Number 12	Servicing a vehicle	12.2	Inspect the under-body for any visible	Practical knowledge

LOs AS PER THE SAG ARM LEVEL TWO				
Topic Number	Topic	Learning Outcome Number	Learning Outcome	Coding
			leaks, wear or damage to components	
Topic Number 12	Servicing a vehicle	12.2	Inspect the engine compartment	Practical knowledge
Topic Number 12	Servicing a vehicle	12.3	Inspect the fluid levels of the vehicle	Practical knowledge
Topic Number 12	Servicing a vehicle	12.3	Change the engine oil and the filter	Practical knowledge
Topic Number 12	Servicing a vehicle	12.3	Change the automatic transmission fluid and filter	Practical knowledge
Topic Number 12	Servicing a vehicle	12.3	Apply lubricants or grease to lubrication or grease points	Practical knowledge
Topic Number 12	Servicing a vehicle	12.3	Adhere to the safety rules and regulations of the Occupational Health and Safety Act (Act 85 of 1993) and workshop policies and procedures	Practical knowledge
Topic Number 12	Servicing a vehicle	12.4	Perform a post-operational service check.	Practical knowledge
Topic Number 12	Servicing a vehicle	12.4	Confirm conformance to the service schedule.	Practical knowledge
Topic Number 12	Servicing a vehicle	12.4	Visually inspect the vehicle for any leaks.	Practical knowledge
Topic Number 12	Servicing a vehicle	12.4	Road test the vehicle.	Practical knowledge
Topic Number 12	Servicing a vehicle	12.5	Clean the interior and exterior of the vehicle.	Practical knowledge

LOs AS PER THE SAG ARM LEVEL TWO				
Topic Number	Topic	Learning Outcome Number	Learning Outcome	Coding
Topic Number 12	Servicing a vehicle	12.5	Clean the work area and ensure that all spilt fluids and lubricates have been wiped up and the surface is dry.	Practical knowledge
Topic Number 12	Servicing a vehicle	12.5	Dispose of all the waste materials, fluids, lubricants, filters and other rubbish according to safety, health and environmental procedures.	Practical knowledge
Topic Number 12	Servicing a vehicle	12.5	Clean all tools and equipment that were used and store them in their appropriate storage area according to workshop procedures.	Practical knowledge
Topic Number 12	Servicing a vehicle	12.5	Complete the required documents to record servicing activities	Practical knowledge

APPENDIX 16: LOS 12.1 - 12.5 AS PER SAG NCV ARM

The LOs from the SAG where there is a relationship between practical knowledge and theoretical knowledge

LOs from Topic Two of the SAG NCV ARM

LOs AS PER THE SAG ARM LEVEL TWO				
Topic Number	Topic	Learning Outcome Number	Learning Outcome	Coding
Topic Number Two	Tools Applicable to the Automotive Trade	2.1	Identify and correctly use various workshop tools applicable to the automotive trade	Work process knowledge
Topic Number Two	Tools Applicable to the Automotive Trade	2.1	Identify and use special tools applicable to the automotive trade	Work process knowledge
Topic Number Two	Tools Applicable to the Automotive Trade	2.2	Identify various hand tools	Practical knowledge
Topic Number Two	Tools Applicable to the Automotive Trade	2.2	Use different types of hand tools correctly	Practical knowledge

APPENDIX 17: LOS 2.1 - 2.2 AS PER SAG NCV ARM

LOs from Topic Seven of the SAG NCV ARM

LOs AS PER THE SAG ARM LEVEL TWO				
Topic Number	Topic	Learning Outcome Number	Learning Outcome	Coding
Topic Number Seven	Batteries	7.1	Explain safety precautions when working with batteries	theoretical knowledge
Topic Number Seven	Batteries	7.1	Explain the personal protective equipment(PPE) to wear when working with batteries	theoretical knowledge
Topic Number Seven	Batteries	7.2	Describe the construction of a vehicle/automobile battery	theoretical knowledge
Topic Number Seven	Batteries	7.2	Describe the functions of various battery components	theoretical knowledge
Topic Number Seven	Batteries	7.3	Explain the safety precautions when removing and replacing a vehicle/automobile battery	theoretical knowledge
Topic Number Seven	Batteries	7.3	Remove a battery from a vehicle according to manufacturer's specifications	Practical knowledge
Topic Number Seven	Batteries	7.3	Replace a vehicle battery according to manufacturer's specifications	Practical knowledge
Topic Number Seven	Batteries	7.4	Explain the capacity of a battery (i.e. amp hour rating and cold cranking amps – CCA).	theoretical knowledge
Topic Number Seven	Batteries	7.4	Explain sulphation of batteries	theoretical knowledge
Topic Number Seven	Batteries	7.4	Perform a visual inspection on a battery	Practical knowledge
Topic Number Seven	Batteries	7.4	Measure the open voltage of a battery	Practical knowledge
Topic Number Seven	Batteries	7.4	Perform a battery leakage test.	Practical knowledge

Topic Number Seven	Batteries	7.4	Perform a hydrometer battery test.	Practical knowledge
Topic Number Seven	Batteries	7.4	Perform a load test on battery	Practical knowledge
Topic Number Seven	Batteries	7.4	Explain the influence of temperature on a vehicle battery	theoretical knowledge
Topic Number Seven	Batteries	7.5	Explain the safety precautions when charging batteries	theoretical knowledge
Topic Number Seven	Batteries	7.5	Explain the series and parallel connection of batteries.	theoretical knowledge
Topic Number Seven	Batteries	7.5	Charge vehicle/automobile batteries correctly	Practical knowledge
Topic Number Seven	Batteries	7.6	Explain the safety precautions when jump- starting a vehicle.	theoretical knowledge
Topic Number Seven	Batteries	7.6	Jump-start a vehicle according to the manufacturer's specifications and procedures	Practical knowledge

APPENDIX 18: LOS 7.1 - 7.6 AS PER SAG NCV ARM

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MOTOR WORKSHOP DIVISION

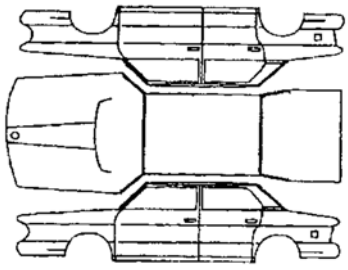
% F J SITHOLE ROAD
PIETERMARITZBURG

Tel: (033) 3412258
Fax: (033) 3984062

CUSTOMERS NAME AND POSTAL ADDRESS	DELIVERY TO:
NAME: _____	GROUP: _____
ID NO: _____	DATE: _____

Registration Number		Date of 1st Reg.	1988	Job Number	
Manufacturer	VOLKSWAGEN	Selling Dealer		Date	
Model	JETTA	Last Serviced		Service Advisor	
Engine Number		Contact		Account Number	
Chassis Number		Telephone Number		VAT Number	
Kilometers		Time Promised		Order Number	

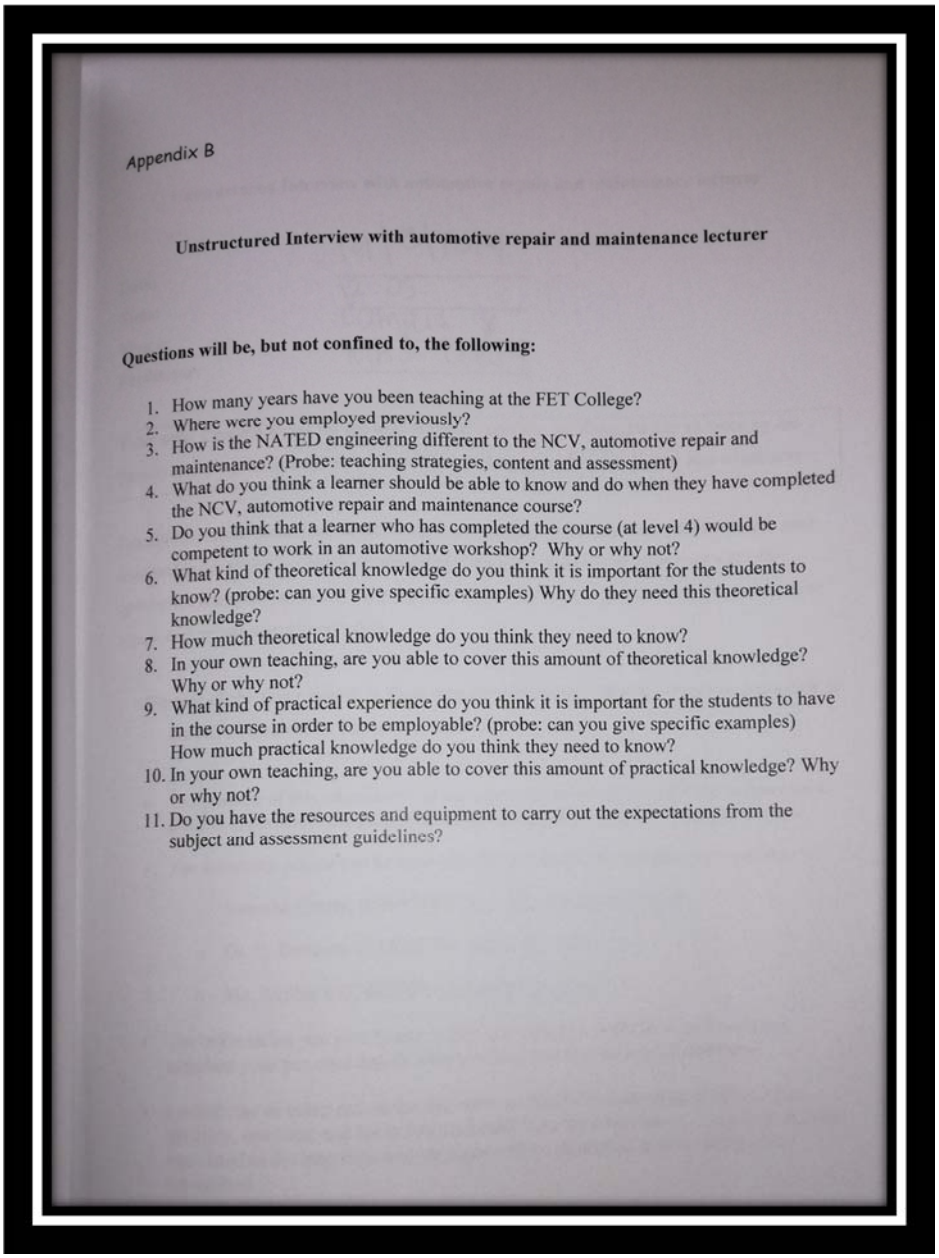
Operation/Description	Quantity/ Time Units	Unit Price	Unit	Disc. %	Amount
1 – PERFORM A PRE-SERVICE INSPECTION					
2 – INSPECT, REMOVE AND ROTATE THE WHEELS					
3 – ADJUST THE HEADLIGHTS					
4 – COMPLETE AN INSPECTION OF THE COOLING SYSTEM					



	Goods Value	VAT Rate	Taxable Amount	VAT		
Parts					NET ►	
Labour					TAX ►	
Subtlet					TOTAL ►	

I ACKNOWLEDGE THAT I HAVE READ AND UNDERSTOOD THE TERMS OF THE COMPANY'S CONDITIONS OF CONTRACT AS DISPLAYED IN THE PREMISES AND AGREE TO BE BOUND BY THEM.

RECEIVED IN GOOD ORDER AND CONDITION: - SIGNED:



Appendix B

Unstructured Interview with automotive repair and maintenance lecturer

Questions will be, but not confined to, the following:

1. How many years have you been teaching at the FET College?
2. Where were you employed previously?
3. How is the NATED engineering different to the NCV, automotive repair and maintenance? (Probe: teaching strategies, content and assessment)
4. What do you think a learner should be able to know and do when they have completed the NCV, automotive repair and maintenance course?
5. Do you think that a learner who has completed the course (at level 4) would be competent to work in an automotive workshop? Why or why not?
6. What kind of theoretical knowledge do you think it is important for the students to know? (probe: can you give specific examples) Why do they need this theoretical knowledge?
7. How much theoretical knowledge do you think they need to know?
8. In your own teaching, are you able to cover this amount of theoretical knowledge? Why or why not?
9. What kind of practical experience do you think it is important for the students to have in the course in order to be employable? (probe: can you give specific examples) How much practical knowledge do you think they need to know?
10. In your own teaching, are you able to cover this amount of practical knowledge? Why or why not?
11. Do you have the resources and equipment to carry out the expectations from the subject and assessment guidelines?

Focus Group Discussion

Date: _____

Time: _____

Venue: _____

Focus group facilitator: _____

Questions:

Let's start the discussion by talking about what interested you in automotive repair and maintenance?

What are some of the things that you enjoy doing in automotive and repair classes?

What are some of the things that you do not enjoy doing in the automotive and repair classes?

Do you prefer the theory component of the automotive repair and maintenance classes? Why?

Do you prefer the practical component of the automotive repair and maintenance classes? Why?

During your automotive and repair classes, is there more theory or practical? Why do you think this is so?

What would you change about your automotive and repair classes, concerning theory and practical? Can you explain why?