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Exploring the use of ICT in a TVET College Course: Towards Blended Learning in Automotive Repair and Maintenance

Morudu, Koketso

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University of the Witwatersrand, Johannesburg

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EXPLORING THE USE OF ICT IN A TVET COLLEGE COURSE: TOWARDS BLENDED LEARNING IN AUTOMOTIVE REPAIR AND MAINTENANCE

Submitted By:

BY

KOKETSO MORUDU

STUDENT NUMBER: 729521

ETHICS POTOCOL NUMBER: 2020ECE172M

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SUPERVISOR: DR.V.S NAIKER

DATE: APRIL 2021

DECLARATION

I Koketso Morudu, student number 729521 hereby declare that this study titled "*Exploring the use Of ICT in a TVET College Course: Towards Blended Learning in Automotive Repair and Maintenance*" is my individual unaided work and it has not been submitted before for any degree or examination at any other university. All the sources that the study employed have been mentioned and acknowledged by a way of complete references.

M Ed Student: K. Morudu

Signature: _____

Date: _____

DEDICATION

This study is dedicated to all the vocational lecturers and educators who strive to sustain Technology Education without success due to contextual reasons. Furthermore, it is dedicated to vocational TVET College students with the aim of meeting the scare skills field in order to contribute effectively in their communities.

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ACRONYMS	**IN FULL**
ANC	African National Congress
AET	Applied Engineering Technology
ARM	Automotive Repair and Maintenance
CBT	Competency Based Training
CAI	Computer Assisted Instruction
CBI	Computer Based Instruction
CK	Content Knowledge
DBE	Department of Basic Education
DHET	Department of Higher Education and Training
EGD	Engineering Graphics and Design
EPM	Engineering Practice and Maintenance
EP	Engineering Processes
E & RD	Engineering and Related Design
ICTs	Information Communication Technologies
LMS	Learning Management Systems.
MT	Material Technology
NATED	National Accredited Technical Education
NC (V)	National Certificate Vocational
NQF	National Qualification Framework
PCK	Pedagogical Content Knowledge
PK	Pedagogical Knowledge
PEP	Professional Engineering Practice
RQ	Research question
SETA	Sector Education and Training Authority
TVET	Technical and Vocational Education and Training Colleges
TCK	Technological Content Knowledge
TK	Technological Knowledge
TPACK	Technological Pedagogical and Content Knowledge
TPK	Technological Pedagogical Knowledge
UNESCO	United Nations Educational Scientific and Cultural Organization

ABSTRACT

Technical and Vocational Education and Training (TVET) Colleges are an avenue that allows individuals to develop knowledge and skills for a specific trade. These skills are aimed at supporting social and economic development, creating national wealth in an attempt to eradicate poverty. According to the Department of Higher Education and Training (DHET, 2014), TVET institutions play a fundamental role in developing knowledgeable and highly skilled citizens, who will be able to contribute effectively to the social, political and economic development of South Africa.

The study sought to explore the use of ICT in a TVET College course towards blended learning in Automotive Repair and Maintenance (ARM). The study reports that lecturers have sufficient knowledge of ICTs and how to use them for successful knowledge construction towards blended learning in ARM, however they are disadvantaged due to lack of resources. Existing literature provides various factors that give advantages and disadvantages towards the difficulties of acquiring knowledge in ARM. The study aimed to explore the current instructional practices in ARM lecturers offering NC (V) level 3 and 4, in an attempt to see if and how they used blended learning in the instruction of ARM. Furthermore, to discover how lecturers use their subject expertise to ascertain that maximum results are produced within the College and that the full potential of students is reached. The study made use of qualitative research methods and purposive sampling was used to select six ARM lecturers who offer NC (V) level 3 and 4. The study employed the use of Semi-structured (open-ended) telephonic interviews. Additionally, the study made use of the TPACK framework and utilized some competencies within TPACK as it "emerged as a useful construct for researchers working to understand technology integration in learning and teaching" (Koehler & Mishra, 2009).

The key research findings arising from the study reveal that TVET lecturers attempted to use technology to support and enhance their teaching practices and students' learning, however the issue of resources came as a big challenge, hence it is a challenge to integrate ICTs to enable blended learning. Furthermore, the study concluded that lecturers' usage of technology was constrained by inadequate resources, and also lecturers needed an exposure

to alternative pedagogical theories and practice rather than traditional methods of instruction. The study recommends that to improve ICT integration towards blended learning, there is a need to provide professional development activities related to the use of technology to update lecturers' skills and knowledge, and offer technical support when needed. Furthermore, there should be continuous and periodic training and retraining of lecturers in order for them to be in line with recent technological developments within ARM.

Key words: Technical Vocation Education and Training, Lecturers, Automotive Repair and Maintenance, Technological Pedagogical Content Knowledge, Information and Communications Technology, Blended learning.

CHAPTER 1: ORIENTATION AND OVERVIEW OF THE STUDY

1.1 INTRODUCTION AND BACKGROUND OF THE STUDY

Technical and Vocational Education and Training (TVET) Colleges in South Africa are known to play a vital role in developing knowledgeable and highly skilled citizens, who would be able to contribute effectively to the social and economic development of our country (Department of Higher Education and Training, DHET, 2013). Given the growth of TVET Colleges in the country, it is evident that such Colleges still enrol fewer students compared to universities. Consequently, it then becomes a challenge, as this is not good for the development of a less-skilled and educated workforce, nor is it adequate enough to meet the needs of an economy, which has a shortage of skilled artisans (DHET, 2014). According to the Department of Basic Education (DBE, 2011) technology education was introduced into the South African curriculum as means of recognising the need for the country to produce engineers, welders and technicians so as to develop a technologically literate generation and in an attempt to curb the shortage of skilled workforce. On the other hand, within the engineering world, Engineering and Related Design (E&RD) serves as a fundamental foundation for future engineers and artisans; in terms of the construction, design, repair, maintenance and the operation of the Manufacturing industry. Automotive Repair and Maintenance (ARM) is one of the disciplines of E&RD, which focuses on concepts and principles in the mechanical (motor, mining, shipping, rail, power generation, just to mention few) environment and on technological processes (DHET, 2013).

The quality and efficacy of Technical Vocational Education (TVE), ARM in particular, relies on various factors. These factors include instructional methods that occur in the classroom (this in particular makes reference to infrastructure), which is inclusive of workshops and laboratories. In addition to this, another factor which amalgamates all the factors mentioned above in to one is pedagogy. Ts'eane (2018, p.37) argues that pedagogy is of utmost importance in the process of the transforming and instruction of ARM because it is important to understand the teaching and learning methods which would work best for this context. ARM involves the integration of both theory and practice. Therefore, it encompasses hands-on techniques and the application of scientific principles. Thus, Maeko & Makgato (2014,

p.324) argue that it is essential that for constructive and productive learning to occur, proper well-equipped workshops with good and maintained equipment must be made available at Colleges that offer ARM.

According to Khoza (2013, p.1) "the traditional teaching methods and approaches are not emphasizing the students' visualization and technical skills" which is why in some cases students tend to struggle in acquiring technical knowledge. Some lecturers who work within the TVET College system have the academic (theoretical) knowledge as well as 'industry-based knowledge'. However, with the increased use and integration of technology in our education system, the ability to integrate technology is slowly becoming a pre-requisite skill that lecturers need to function with and teach students effectively in the TVET College space. Alfred (2014) argues that most lecturers are slowly adapting to the use and applications of various Information and Communications Technologies (ICTs) in their institutions in the endeavour to keep up with current trends and also to accommodate their digital savvy students. Thus, Alfred (2014) alludes that this can in turn impact on the students' ability to construct knowledge and become skilled artisans. ICT's can enhance the scope of education by facilitating mobile learning and inclusive education, as it provides a wide range of content, additionally it is important for artisans to be digitally savvy (Ts'eane, 2018, p.46). Consequently, the lecturers need to be equipped with the knowledge and skills of incorporating the use of ICT's. As a result, the researcher became interested in trying to understand how selected TVET College lecturers use ICT's in their regular instruction of ARM.

According to Naiker (2017, p.6) technical skills that are offered in ARM play a "crucial role in the endeavour to meet the skill shortage and drive for the economy of South Africa". Furthermore, TVET Colleges' educational system combines education, training, and skills development. This is within a particular aim of training students for different skills needed for future jobs. TVET Colleges train ARM students to be knowledgeable and skilled in that specific vocational profession. TVET Colleges offer National Certificate (Vocational), NC (V), which is a modern qualification offered in TVET Colleges since 2007. The qualification is offered at Levels 2-4 of the National Qualifications Framework (NQF) which are equivalent to Grades 10-12. Upon completion of NC (V) level 3 and 4; including practical

training and competency assessment, students would be several steps into the industry and can be recognized as artisans. ARM provides necessary knowledge and skills for the future of artisans. Furthermore, Naiker (2017, p.6) argues that due to reasons that Vocational Education is in TVET Colleges, the "effectiveness and quality of such Colleges should be given priority to ensure the production of human capital". It thus must be noted that the role of TVET Colleges has implications in the TVET sector, consequently requiring lecturers to be subject specialists in technical curriculum instruction. According to Ndzoyiya (2019, p.34) ARM lecturers firstly need to be specialists in areas of knowledge which are related to specific occupational fields such as Engineering and Related Design (E&RD), which in education and training is part of the framework of Pedagogical Content knowledge (PCK). Thus, lecturers' roles have changed into choosing pedagogical approaches and choosing the appropriate technology for the content to be discussed and being the designer of the curriculum (Mishra & Koehler, 2008, p.13).

TVET College lecturers undertake an active and significant role in the development of skilled artisans; therefore, it is of utmost importance for them to ascertain that they have positive attitudes towards the module, ARM. Furthermore, a TVET College lecturer should have a strong, not just foundational Technological Pedagogical Content Knowledge (TPACK) in order to enhance their instructional practices and to ensure that students are properly trained with sufficient knowledge for the workplace. According to Mishra & Koehler (2009, p.63) "TPACK is a technology integration framework that identifies three types of knowledge (pedagogical, content and technological knowledge) that lecturers need" to combine for successful technology integrated lesson. Consequently, the lecturer offering ARM must be a trained subject specialist; can be an artisan, technician or even a qualified technical lecturer in automotive-related area. He or she should have "industry-related experience and proper workshop management skills are essential" (DHET, 2014, p.14). This is due to the reason that ARM uses a lot of high technology machines and such machines require certain skills a lecturer should have as s/he will impart such skills to the students.

Lecturers in TVET Colleges are deemed to offer vocational education which is supposed to meet the demands of the workplace and further learning; thus they must take it upon themselves to make sure that they equip the students with necessary knowledge needed.

Students' success in knowledge construction "depends on the appropriate implementation of the curriculum using modern media, technologies which are underpinned by the relevant theoretical frameworks as well as the logical connection of the three parts of the curriculum namely, theory, practice and work experience" (Barnett, 2006, p.143 as cited in Naiker, 2017, p.3). According to Ts'eane (2018, p.20) recent surveys have revealed that lecturers' use of technology within ARM is not effectively incorporated nor has it been embraced in pedagogically defensible ways. Therefore, there is a need for lecturers to embrace 'technology' knowledge appropriate to industry and workplaces, to integrate it more effectively into their pedagogy towards blended learning. Blended learning in this study refers to the combination of face-to-face classroom instruction along with Web-based e-Learning (online learning) to bridge the learning gaps within a course or module. To put it lightly, blended learning for this study means teaching using ICT and face-to-face instruction. Instead of a traditional classroom or online based learning only, blended learning does not overlook the fact that both provide sufficient opportunities to students to be enabled to construct knowledge. To put it in to simple terms, the lecturer in the classroom and online learning along with internet sources are both integral to the process of knowledge construction. Therefore, it is imperative for ARM lecturers to understand the usages of ICTs or rather have technological knowledge (TK).

In contrast, Naiker (2017) further argues that there was a study undertaken by National Business Initiative (NBI) on South African TVET College lecturers; it provided an initial picture of the qualifications of TVET College lecturers and their capacity to deliver the theoretical and practical components of the NC (V) curriculum. The results of the study revealed that there are significant weaknesses in the current capacity of lecturers which in turn impacted on the quality of delivery, as was demonstrated through the national examination results (Umalusi report 2008, as cited in Naiker, 2017, p.3). Basically, some lecturers cannot effectively teach nor implement ICTs. Thus, these difficulties could be attributed to the lecturers' PCK in the engineering fields (ARM being one of the modules) with the lecturers later failing to integrate ICT's into their practice.

Taylor (2011, p.47) argues that "TVET lecturers' in South Africa are ill-prepared to deliver the curriculum". It is further argued that there are deficiencies in lecturers' capabilities to

meet the competencies required for effective lecturing. Therefore, this becomes a problem within the automotive industry. How can it be expected that the production of ARM artisans is dependent upon someone who is ill-prepared to deliver such content? Ndzoyiya (2019) alludes that most of ARM lecturers enter the sector with rich content knowledge of a particular trade or vocation and it is assumed that they bring with them knowledge of the tools and the technology of this industry from the workplace. However, this is a huge assumption. It should not be assumed that ARM lecturers have developed sufficient pedagogical knowledge to inform their instructional practices, let alone the technological knowledge required to integrate technology with their pedagogy. Therefore, it is crucial that ARM lecturers have the knowledge to effectively integrate new technologies into their teaching process and adopt blended learning methods. This would mean that ARM lecturers would be aware that students are able to create and produce knowledge rather than merely consuming the knowledge that is produced by those in power (Mishra & Koehler, 2006; Mishra, 2006). Thus, the study attempts to reveal if such gaps as mentioned above still exists.

The effective use of blended learning in the process of instruction in ARM may provide the catalyst needed to change TVET lecturer's pedagogical practices. According to Weterman & Kelly (2011) the importance of a structured approach to building blended learning capabilities is real; pedagogical practices are evolving as are the changing needs of the workplace and the growing gap between the technology skills between the lecturers and the students. In this case, ICTs should be adopted as tools of blended learning for vocational learning and often be used to add value to the learning environment. According to Raihan & Han (2013) blended learning offer TVET students an opportunity to learn ubiquitously without being limited to the constraints of time and distance. Additionally, students in ARM would be experiencing the great accessibility and flexibility that ICTs offer. Rosenberg (2001) argue that blended learning, has a feature of online learning that enables lecturers to have instant updating, distribution, and sharing of information in situations where it cannot be physically done (as cited in Raihan & Han, 2013, p.62). Blended learning has become increasingly important in higher education as it has the advantages of both online and traditional instructions (Horton, 2000 as cited in Raihan & Han, 2013, p.62). Garrison & Kanuka (2004) argue that learning outcomes become enhanced when the rich dynamics of online learning are thoughtfully integrated with traditional classroom instruction.

Vaughan (2007, p.5) define blended learning as "the thoughtful fusion of face-to-face and online learning experiences" emphasizing the need for reflection on traditional approaches and for redesigning learning and teaching in this new terrain. According to Charles, Hartman & Moskal (2004) blended learning should be viewed as a pedagogical approach that combines the effectiveness and socialization opportunities of the classroom with technology enhanced active learning possibilities of the online environment, rather than a ratio of delivery modalities. Blended learning in modules such as ARM should be approached not merely as a temporal construct, but rather as a fundamental redesign of the instructional model with (i) a shift from lecture to student-centred instruction in which students become active and interactive, (ii) increases in interaction between student-instructor, student-student, student-content, and student-outside resources, and (iii) integrated formative and summative assessment mechanisms for students and instructor.

Thus, in this case technology plays a major role in the adoption of blended learning, hence the lecturers that offer ARM courses need to have the 'know how' of effectively implementing technology to enable students to successfully construct knowledge. Koehler & Mishra (2009, p.63) alludes that "TPACK shows us that there's a relationship between technology, content, and pedagogy, and the purposeful blending of them is key in order to promote a better understanding of the collaboration between technology and pedagogy". Consequently, the researcher got fascinated by the possibilities that ICTs could offer in TVET, especially in a technical module like ARM. According to Maeko & Makgato (2014) the module comprises of practical tasks rather than only being theory based. Given the argument about blended learning, the researcher became fascinated by ARM and wondered how lecturers of such a module undertake the process of instruction using blended learning methods, if they do. With the intention to examine the way ICTs are integrated into the module and their impact on the process of instruction. Thus, the study attempted to explore how effective the process of instruction is achieved using blended learning in ARM.

In view of the DHET report on NC(V) with regards to ARM, the researcher believed that it was worth examining the effectiveness of implementing and integrating blended learning within ARM. The challenges and succession that arise in implementation and integration

should be highlighted as to make recommendations to ensure that effective process of instruction enhances and continues to thrive. Raihan & Han (2013, p.62) argues that lecturers' experiences within the module affects the way blended learning can be implemented and integrated thus this has major impacts in practice. Lastly the research sheds light on the burdens (if any) related to the process of instruction in ARM and blended learning integration as means of also improving them especially in the early stages of blended learning integration.

According to an article published on www.iol.co.za by the deputy secretary-general of the African National Congress (ANC), Jessie Yasmin Duarte in August 16th 2017 "statistics show that South Africa has a shortfall of about 40 000 qualified artisans. This is measured against the annual production rate of 13 000 qualified artisans. The skills shortage is a key obstacle to economic growth, job creation and business expansion". She further alluded that "job creation begins with a skilled workforce and requires policies geared towards fostering an environment in which there is a cohesive approach in terms of education outcomes to grow our human capital. The government continues to encourage more young learners to train to become artisans"[1]. Subsequently, there is a severe shortage of artisan skills including ARM technicians "which on the contrary forces the country to hire expatriate technical skilled artisans which are not available locally" (Buthelezi, 2018, p.5). Badenhorst & Radile (2018) argue that SA vocational training institutions are less equipped to respond to the skills requirements of employers and to the transition of young people into suitable jobs. Consequently, the unemployment rate keeps rising because instead of local people occupying posts, non-South African nationals do. According to Ndzoyiya (2019) most of professional artisans come from outside the boarders of South Africa. Thus, this has become a problem, which should be addressed, because it affects the country's economy. Be that it may, considering that the second quarter statistics that were released by Statistics South Africa, (2019) revealed that 29% of SA population, particularly youth are unemployed. Contemporary employers are looking for digital savvy graduates; how can then integration of ICT in TVET help to curb skills development in the country? With the TVET Colleges being earmarked to produce skills, the DHET has since attempted to revamp these institutions of

[1] Duarte, Jessie Yasmin "The rise of artisans 2017 Speech" published on www.iol.co.za Accessed 12th Nov 2020

Higher Learning to impart skills to the students. Students in TVET Colleges are of the hope that they would contribute meaningfully to the country's economy.

However, the production of technical skilled artisans depends upon the knowledge TVET lecturers have and imparts to their students. In contrast, Naiker (2017, p.6) argues that students' poor performance can be attributed to the lecturers' incapacity to deliver the theoretical and practical components of the curriculum. Nevertheless, Wrenn & Wrenn (2009, p.258) argue that, lecturers in service-related fields should have the desire that their students "not only learn theory and understand why theories are important but also learn how to apply the theoretical frameworks into practice". In addition, Wrenn & Wrenn (2009, p.258) allude that, students in some instances struggle to create shifts between "theory and practice with confidence and effectiveness, the cause of this difficulty in making the transition from theory to practice arises from a failure of the lecturer to integrate blended learning in both theory and practice into the same course in the curriculum in ways that are relevant and meaningful to the student". It is therefore the lecturers' prerogative to enable students to be optimistic about the course and develop a passion for vocational education, which can in turn result in the students having positive attitudes that will benefit them, as well as the economy of the country. With the current crop of students at TVET Colleges and in the general schools being those born in the digital age, ICT integration is seen as the best pedagogy for the classroom as these young students enjoy the usage of such.

Thus, the researcher's interest in TVET has motivated him to explore the instructional practices of College lecturers presenting ARM with respect to the integration of ICTs towards blended learning in their instructions. The study is envisioned as providing value as it will provide a clear picture of how effective the process of instruction could be when blended learning is integrated in practice, especially in teaching of ARM by providing findings and recommendations that can be used to improve the instruction of the module Scott & Morrison (2006, p.58). With that being said, the research sought to explore ARM lecturers' knowledge, towards blended learning.

1.2 RATIONALE OF THE STUDY

The production line of different Automotive industries produces several vehicles within an hour, however when booking a routine service, mechanical technicians require the whole day to perform the work on the vehicle. This is more observational evidence to support the claim that the country is faced with an issue of shortage of artisan skills, which in turn affects our economy. Consequently, the study is conducted because the researcher would like to gain insight of the lecturers' instructional methods, to understand the pedagogical practices they undertake to the production of such important skills the country lacks. This study is significant to ARM lecturers and TVET College stakeholders as the results expose problems within their field of specialisation; thus, the results could be used in the betterment of lecturers' development of skills. The lecturers are responsible for producing these artisans, the ways in which they present knowledge needs to be explored to see if knowledge and skills taught are relevant and in line with the modern century. Raihan & Han (2013) argue that some of the lecturers' instructional practices have a negative impact on the process of knowledge construction as they are ill-prepared to present such content. Additionally, the study was motivated by the need to gain insight into how ICTs are being utilized in ARM classrooms and to establish how the use or integration of ICTs affects the pedagogical practices that lecturers take on. Ertmer (2006) argues that ICTs can only function as a relevant pedagogical tool if, p. (1) teachers have convenient access; (2) are adequately prepared; (3) have some freedom in the curriculum; and (4) hold personal beliefs aligned with technology. Thus, the study also attempted to uncover some of the key issues and challenges that hinder the process of ICT and blended learning integration in ARM instruction.

In recent times, most technical jobs are no longer using manual power but digital tools and as such the TVET College curriculum should be aligned to that as well including the way the content is presented. Failure for the TVET College lecturers to align to that, there might be a possibility of seeing a rise in the 29% of joblessness mentioned by Stats SA, with the youth being most implicated and they would not find employment because of having irrelevant skills for the word of digitally savvy work.

1.3 PURPOSE OF THE STUDY

The purpose of this study was to explore Automotive Repair and Maintenance lecturers' methods of instructional practice and to explore their perceptions with regards to the integration of blended learning in the instruction of ARM in NCV Level 3 and 4 in Gauteng province. This was to comprehend if the lack of implementation of ICT and lack of integration of blended learning still exists. TVET Colleges play a major role in the production of ARM skilled artisans, for the students to become specialized artisans they undergo a process of knowledge and skill acquiring through the help of a specialist, which is the lecturers located in TVET institution. Nevertheless, Cross & Adam (2007) argue that the use of basic ICTs has not been prioritized because the main goals and principles of the Higher Education Policy framework does not place much emphasis on the use of technology in institutions of higher learning, especially at TVET level. Thus, this study was geared towards attempting to find the gaps, which exist in the integration of ICT and implementation of blended learning in TVET Colleges by ARM lecturers.

1.4 AIM OF THE STUDY

The study aimed to explore the current instructional practices in Automotive Repair and Maintenance lecturers (offering NCV Level 3 and 4) with respect to the integration of ICT towards blended learning in their instructions. According to Raihan & Han (2013) the usage of blended learning received ambiguous responses, as it includes the usage of ICTs, consequently some lecturers are still reluctant to use ICTs in their lessons because they fear using the gadgets.

1.5 PROBLEM STATEMENT

Higher education in South Africa is under increasing pressure to meet the social transformation and skills needs of the new South Africa (Kistan, 2002 as cited in Jaffer, Ng'ambi, & Czerniewicz, 2007, p.132). TVET Colleges were positioned to "address priority skills demands by delivering sound general-vocational programs that would prepare young

people for entry into the workplace" (Gewer 2016, p.32 as cited in Buthelezi 2018, p.2). However, TVET Colleges are slowly adapting the use and applications of various ICTs in their institutions in the endeavour to keep up with current trends and also to accommodate their digital savvy students. The harsh realities remain that even though the higher education system has envisaged a global learning environment whereby ICTs are a driving force, some of the South African TVET institutions are still facing a challenge of adopting such initiatives. Additionally, Buthelezi (2018) alludes that in some institutions there are infrastructural problems where lectures do not have access to workshops and a shortage of resources like simulators would be challenges some of the lecturers would face daily.

In contrast, Buthelezi (2018) argues that other lecturers in Engineering and Related Design (E&RD) courses (this is where ARM is located) are not always able to keep up with the introduction and usage of all these various technologies, especially when it comes to their pedagogies. Moreover, the national education quality assurance body in South Africa, Umalusi (2014, p.68) concluded that the majority of TVET lecturers are ill-equipped to cope with the academic and social demands of vocational teaching. Badenhorst & Radile (2018) argue that the major causes of students' poor performance are outlined as the lecturers' lack of subject expertise and their inability to meet administrative requirements to undertake practical work. However, DHET (2013) argues that it is essential for lecturers who work in TVET Colleges to have what are deemed as 21st century skills, which include skills such as the ability to learn new key issues quickly, the ability to use modern day technology within the workplace, to have ICT skills that can either be at a basic or advanced level. DHET (2013) further alludes that these 21st century skills are not only essential for lecturers, but they are also critical for their students as well. This study then aimed to explore the lecturers' instructional practices in ARM with respect to the integration of ICTs towards blended learning in their instruction.

1.6 THE MAIN RESEARCH QUESTION

The main research question of the study was phrased as follows:

What are the NC (V) Level 3-4 TVET College lecturers' challenges in applying blended learning in ARM?

1.6.1 SUB-RESEARCH QUESTIONS

RQ1: What are the TVET College lecturers' knowledge of blended learning in the instruction of Automotive Repair and Maintenance?

RQ2: How does ICT aid blended learning in the instruction of Automotive Repair and Maintenance concepts?

1.7 THEORETICAL FRAMEWORK

Due to reasons that this study aims to explore ARM lecturers' instructional methods towards blended learning, the model adopted in the study is the professional knowledge framework proposed by Mishra & Koehler (2006) known as Technological Pedagogical Content Knowledge (TPACK). The TPACK framework emphasizes Technological Knowledge (TK) and technology integration in the whole process of teaching and learning is most important. TPACK should not be viewed as a tool used to facilitate teaching and learning processes, however as the necessary and compulsory knowledge that every lecturer must have. TPACK was introduced to the educational research field as a theoretical framework for understanding knowledge required for effective technology integration (Mishra & Koehler, 2006 cited in Mishra, Koehler & Shin, 2009, p.123). The TPACK framework can be used to guide lecturers to successfully integrate technology into their instructional processes. The TPACK framework comprises of areas of knowledge that include multiple disciplines and that the lecturer must be able to utilise concretely in different situations when presenting knowledge as means of effectively integrating ICTs. The theoretical Framework is discussed in depth in Chapter 2.

1.8 RESEARCH DESIGN AND METHODOLOGY

The design of a research plays an important role in shaping the researchers research as it often acts as a blueprint that outlines the procedures that the researcher would be undertaking when conducting their research as means of investigating and providing answers to the research problem. According to Scott & Morrison (2006) research design refers to the schema or plan that constitutes the entire research study. Scott & Morrison (2006, p.58) further add that the research design "includes a summary of the intended research topic and distinguishes between the research problem and the research questions that are derived from the problem". The latter would assist the researcher with answers to the problem that the researcher wishes to address. Also the study employed qualitative research approach as means of providing answers to the research questions posed. Thus, the researcher employed a case study as the study's design to gain an in-depth analysis.

According to Marshall & Rossman (2011) a qualitative approach is one in which the investigative enquiries often make knowledge claims based primarily on constructivist perspectives (i.e., the multiple meanings of individual experiences, meanings socially and historically constructed, with the intent of developing a theory or pattern) or advocacy /participatory perspectives (i.e., political, issue related, collaborative or chance oriented) or both. Therefore, qualitative research sought to understand and interpret "the meaning of phenomenon from the views of the participants" and how they understand the world around them. The study uses qualitative research methods approach due to the purpose that the research is structured into exploring the lecturers' integration of ICT towards blended learning in the instruction of ARM. Issues related to challenges faced by lecturers during integration were also explored. Thus, for this study, semi-structured telephonic interviews (open ended) were used with the aim being to probe the lecturers' insight in their challenges and successful use of ICT integration.

1.8.1 POPULATION AND SAMPLING

The data collections steps include setting the boundaries for the study, collecting information through observations and interviews, documents, and visual material, as well as establishing

the protocol for recording information (Creswell, 2003, p.185). This enabled the researcher to use methods that helped the researcher to obtain enriching information which was generated during the study as to help them understand phenomena explored.

1.8.1.1 Population

Gorard (2001) defines population as the group of participants one wishes to study. According to Mertens (1998) "a population is a group to which the researcher would like the results of the study to be generalized…a population entails the total collection of individuals who are potentially available for observation and who have the attributes in common to which the research question refers" (as cited in Khoza, 2013, p.48). Creswell (2003) acknowledges that the idea behind qualitative research, in regard to population, includes purposefully selecting sites and population that is empirical for the study and can help the researcher in understanding and addressing the research phenomenon. Qualitative research allows the researcher to conduct research in sites of interest and if "they do not disturb the site any more than is necessary" as the participants involved in the study are lecturers within the College setting (Creswell, 2003, p.181). The researcher then needs to make sure that they "build rapport and credibility with the individuals in the study" (Creswell, 2003, p.181). Thus, the population of this study was restricted to three TVET Colleges in Gauteng that offer ARM.

1.8.1.2 Sampling

The researcher understands that the sample chosen plays an important part in describing the research plan set out. Sampling refers to the "activities involved in selecting a subset of persons or things from a larger population" (Scott & Morrison, 2006, p.219). Mertens (1998) explains sampling as "a process of selecting a given number of individuals for a study in such a way that the individuals represent the larger group from which they were selected" (cited in Khoza, 2013, p.48). The purpose of sampling is to use a relatively small number of cases to find out about a much larger number (Gorard, 2001). Furthermore, the "methods used to select the sample will determine the nature and validity of the findings that are generated from the study of that sample" (Scott & Morrison, 2006, p.219) and these influenced and shaped the purpose of the research. Accordingly, two lecturers per College who offer NC (V)

level 3 and 4 were purposefully selected to take part in the study. Thus, purposive selection was used to select a total of six (lecturers who offer ARM from the three TVET Colleges.

1.9 DATA COLLECTION TECHNIQUES

According to Creswell (2003) failure to identify and use the appropriate instrument for the collection of data, could negatively impact the findings generated by the research. The data was collected using semi structured telephonic interviews (open ended) with the lecturers offering the module, to probe the lecturers' insight in their challenges and successful traits in ICT integration.

1.9.1 Interviews

Kvale (1996) argues that even though qualitative research does rely on observations, however it relies quite extensively on interviews. Kvale (1996, p.2) describes qualitative interviews as "a construction site of knowledge" where two (or more) individuals discuss a "theme of mutual interest" (Kvale & Brinkmann, 2009, p.2 as cited in Marshall & Rossman, 2014, p.142). The research interviews of this study focused on issues related to interviewees' views on lecturers training, competencies, and ICT skills development, experiences and competencies of instructing ARM and ICT integration and lecturers' pedagogies. The study made use of open ended semi-structured telephonic interviews, which enabled the researcher to formulate and ask questions "that are more carefully "scripted", asking specific questions in a specific sequence, sometimes without a follow up" (Marshall & Rossman, 2014, p.144). Telephonic interviews were adopted because there is a huge influential crisis the whole world is facing, the outbreak of COVID-19, thus, so as to observe safety precautions the researcher chose not to meet with the participants.

1.10 DATA ANALYSIS

Creswell (2003) asserts that data analysis involves preparing the data for analysis, conducting different analysis, moving deeper and deeper into understanding the data, representing the data, and making an interpretation of the larger meaning of the data. The researcher needs to

be able to interpret and make sense of the data that they have collected using instruments that will help them analyse the data. The interviews with the lecturers were transcribed and evaluated; they were listened to several times to make sure the researcher did not omit anything important the interviewees might have said. Thereafter the researcher began with a detailed analysis with a coding process. "Coding is the process of organizing the material into chunks or segments of text before bringing meaning to data" (Rossman & Rallis, 1998, p.171 in Creswell, 2008, p.184).

1.11 SCOPE AND DELIMITATION OF THE STUDY

According to Theofanidis & Fountouki (2019) delimitations are in essence the limitations consciously set by the researchers themselves. They further argue that delimitations are concerned with the definitions that the researchers decide to set as the boundaries or limits of their work so that the study's aims and objectives do not become impossible to achieve. Therefore, in terms of this study, the sample population was restricted to TVET College lecturers around Gauteng Province. The research highlights lecturers' challenges and competencies in integrating ICTs into their instructional methods. Three pilot Colleges where two lecturers from each were selected, because the Colleges are in close proximity to the researcher's residential area, and they offer ARM. The researcher chose this sample as means of getting an insight on how lecturers of a technical and practical module like ARM integrated ICTs into their instructional methods thus maintaining effective knowledge construction.

The study adopted a semi-structured telephonic interview (open ended) aiming to probe the lecturers' insight in their challenges and successful traits in the instruction of ARM. These interviews developed a deeper understanding of the lecturers' best approaches to learning. This instrument was mainly chosen because it was appropriate and leaned towards the kind of data the study sought to collect.

1.12 CONCLUSION

The main focus of this chapter was to attempt to outline an overview of the purpose of the study and to state some of the problems the TVET sector is facing which alternately affects the whole country's economy, hence the need for this specific study. What the study proposed to achieve, was directly linked to the research questions asked and the significance of the study was outlined. The next chapter gives a review in to existing literature and present the framework adopted.

CHAPTER 2: LITERATURE REVIEW OUTLINING THE ACADEMIC DEBATES SURROUNDING THE STUDY

2.1 INTRODUCTION

The previous chapter provided a brief outline of the research study. The outline was utilized to set the context for most of the foundational elements of the research study that the researcher had to be cognizant of in the journey of conducting this study. Foundationally, this chapter will endeavor to provide a detailed expose on the central elements that constituted to this study, which are the literature review and the framework adopted. The main aim of this chapter is to highlight, shed some light on some of the core conceptual knowledge that builds the foundation of the study, to identify some of the issues, key debates as well as conceptual knowledge that surround the study. This chapter reviews existing research about TVET lecturers' knowledge, about the instruction of ARM using technology. Its purpose is to locate the study within an existing body of knowledge that involves the TVET sector.

2.2 LITERATURE REVIEW

This will unpack existing research in relation to Vocational Education, specifically the lecturer's methods of instruction towards blended learning in ARM in TVET College context. In this literature review, the researcher wishes to situate the study within existing dimensions of research knowledge. However, Chai, Koh & Tsai (2010, p.63) asserts "there is a shortage of such studies as much of existing research has been cantered on the relevance of technology skills instruction". Additionally, Naiker (2017, p.25) argues that there are limited research studies that fit these specific criteria, thus insights shall be drawn from a wider scope of studies drawing out key themes that are perceived to have relevance to this study.

2.2.1 Blended Learning

According to Norm (2012, p.45) blended learning can be understood as a tool which "designates the range of possibilities presented by combining internet and digital media with

established classroom forms that require the physical co- presence of lecturer and students". To understand this definition, blended learning does not exclude the presence of a lecturer; in this case he or she is one of the important factors which enable the process to be successful. Moreover Norm (2012) affirms that blended learning is reportedly more effective than purely face-to-face or purely online classes. Thus, it can be argued that blended learning involves invaluable contact hours carefully fused with educational technologies and capitalizing on the strength of both face-to-face and online engagement. Charles, Hartman & Moskal (2004) argue that blended learning should be viewed as a pedagogical approach that combines the effectiveness and socialization opportunities of the classroom with technology enhanced active learning possibilities of the online environment, rather than a ratio of delivery modalities.

Furthermore Lurrilard (2012) alludes that the results of blended learning enriches learning for students, and also provides administrative and workload relief for lecturers, thus this could be adopted by ARM lecturers to use to their advantage. Blended learning can be implemented by ARM lecturers as it involves teaching strategies that are augmented by effective, value-adding ICTs. Lurrilard (2012) alludes that the main principles of blended learning which such lecturers need to be cognisance of includes, developing students' digital skills for the modern workplace and using digital technology to enhance students' experience. Raihan & Han (2013, p.62) further indicates that the significant pedagogical benefits of a blended approach lie in the promotion of different ways of learning, this includes, but not limited to, p. discussion, investigation, practice, production and collaboration as opposed to only traditional passive learning which inhibits students to construct knowledge. These pedagogical benefits could be adopted within the instruction of ARM as they fit the kind of environment a model like ARM requires.

Lurillard (2012) asserts that to achieve the benefits associated with blended learning, there must be both commitment from teaching staff and institutional support for their efforts. Thus, technological means should be readily apparent and support networks need to be continually accessible in TVET Colleges in order to enable the benefits on blended learning. According to Siemens, Gašević, & Dawson (2015) blended learning methods can also result in high levels of student achievement more effective when combined with face-to-face learning. If

ARM lecturers use a combination of digital instruction and contact time, some students would be enabled to construct knowledge on their own alternately allowing the lecturer some time to support those individual students who may need individualized attention. Siemens et al (2015, p.37) puts it bluntly that "rather than playing to the lowest common denominator as they would in a traditional classroom, TVET lecturers can now streamline their instruction to help all students reach their full potential".

According to Mustafa (2015) proponents of blended learning argue that incorporating ICTs into higher education courses serves to "facilitate a simultaneous independent and collaborative learning experience". Therefore, this can be viewed as some of the major contributors to student satisfaction and success in a module like ARM. It cannot be argued against the fact that the use of ICTs has been found to improve student attitudes towards learning. Lecturers need to come into terms and acknowledge that in this 21st century, students are more digital savvy, and they actually enjoy using ICT gadgets, consequently this can be good as it will allow them an opportunity to use that in to their advantage by incorporating ICTs into class projects, using it for communication purposes, assessments, delivering content etc. Blended learning in ARM allows for personalized education, replacing the model where a lecturer stands in front of the classroom and all students are expected to construct knowledge at the same pace.

2.2.2 Why are ICTs important for Blended learning?

Firstly, ICT is a broad all-encompassing term that is used to denote the usage of radio, television, the internet and the Web, satellite and Wi-Fi systems, mobile telephones, computer hardware and software, audio- and videoconferencing, virtual reality, social media, wikis, 3D printers etc... According to Latchem (2017, p.28) all of these are technologies that enable individuals and communities to find, analyse, transfer, and present information, knowledge, skills, ideas and experiences. Whereas Obadara & Adenaide (2009) allude that ICTs, could accelerate the management trends and changes in the world of work and in general. In addition to that, ICTs also have the potential to immensely improve people's access to quality education and training, through equipping people with certain skills that they will need to effectively function in the workplace. According to Latchem (2017) every

sector, space, sphere of our lives is being infiltrated by technology through a process known as digitalisation – which is a process of integrating digital technologies into every aspect of work and life. Latchem (2017) further argues that this will create endless opportunities for reshaping and improving economies and societies in the near future. UNESCO (2011, p.27) has also formulated a global goal in terms of ICT integration in education and that goal is to create a "world without boundaries" where technologies support education and build inclusive knowledge societies.

According to UNESCO (2011) ICTs allows for distance learning, they can also be utilized to create rich learning experiences or workplace learning. However, it is always important to remember that ICTs are merely just tools that can be used in the process of instruction. Latchem (2017, p.28) argues that the quality, practicality or effectiveness of ICT that enables teaching and learning is "determined by the amount of attention that is given to the issues of accessibility and equitability, principles of adult learning and instructional design and appropriateness of the delivery and support services of ICTs". Furthermore Mishra & Koehler (2009) argue that in as much as technology can help to enhance and make the learning and teaching process more efficient, it is important to note that technologies have their own inclinations, potentials, affordances, characteristics, and limitations that make them more suitable for certain tasks and subjects than others. Hence, it is essential for educators, trainers and lecturers who work within the profession of teaching to develop a thorough understanding how these affordances and limitations which we often term as "constraints" of specific technologies, influence the choice of pedagogical practices that teachers utilize in their classrooms. This is in specific reference to how lecturers integrate technology in their processes of instruction, as this is not a straightforward process. It is a process that may possibly require teacher education intervention programs for pre-service lecturers and professional development programs for in-service lecturers (Koehler & Mishra, 2009).

According to Ghavifekr, Razak, Ghani, Ran, Meixi & Tengyue (2014, p.25) ICT is a shorthand for the computers, software, networks, satellite links and related systems that allow people to access, analyze, create, exchange and use data, information and knowledge in ways that were almost imaginable. In this light, ICTs are seen as tools and a process that can be used in aiding better teaching and learning thus reducing viewing ICTs as hardware. In

practice, lecturers are only able to operate and use few aspects from those previously listed. This is mainly because ICTs are often seen as teaching aids in practice, thus the conflict in lecturers experience and the way they use ICTs often arise. The process of instruction should be active rather than a passive one, where ARM lecturers create and transmit knowledge in a manner that is best suited to represents their lessons. Berge & Barron (1998) postulate that "learning approaches using contemporary ICTs provide many opportunities for constructivist learning through their provision and support for resource-based, student centered settings and by enabling learning to be related to context and to practice" (cited in Noor-Ul-Amin, 2013, p.47). Thus, it is evident and can be noted that ICT should be seen as a vehicle that drives the success of blended learning and can be beneficial in ARM.

2.2.3 What is TVET and its functions?

In order to understand TVET, United Nations Educational Scientific and Cultural Organizations (UNESCO) posits that TVET is used as a comprehensive term referring to aspects of the educational process involving the study of Technologies and related Sciences and the acquisition of practical skills, attitudes, understanding and knowledge relating to occupations in various sectors of economic and social life. TVET is a phase of education, which is aimed at preparing individuals for an occupational field or an aspect of continuing education. It offers instruction in a wide range of trades and occupations to enable the receiver to fit into the world of work (Clarke & Winch, 2012, p.46). Additionally, according to DHET (2012) TVET refers to the 'middle level' provision of knowledge and skills, this level of education assists people to enter the economy through a general broad orientation in vocational areas, as well as through general learning in essential areas such as language and mathematics. Clarke & Winch (2012) further define TVET as "all forms of organised or structured activities, which aim to provide people with knowledge, skills and competencies that are necessary and sufficient for them to perform a job or a set of jobs. It is independent of the venue, age, or other characteristics of the participants and their previous level of qualification. The content that is taught in TVET can be job specific and they can be "directed at a broader range of jobs or occupations" (Clarke & Winch, 2012, p.66). Thus, TVET serves different purposes for different groups of people, mainly the individual, the education system and the employer.

Descy & Tessaring (2000, p.3) argue that "for the individual, it is all about preparation for the prospect of becoming an integral part of industry, for the employer TVET is merely what is viewed as 'a means to an end' as it serves as a hub that equips a potential labour force with key technical knowledge and skills that would enable them to meet the immediate needs of the particular firm or industry that they would be working for. Additionally, Clarke & Winch (2012) allude that for a greater society TVET is seen as a means of producing a more productive force. Compared to normal traditional streams, TVET has two main orientations to teaching and delivering content knowledge. That is essentially what makes vocational institutions different to Basic Education and to traditional institutions of Higher Education. This is the main reason behind why it is deemed as a specialized technical knowledge that has dual purpose. Clarke & Winch (2012) argue that vocational knowledge, unlike school or academic knowledge, is knowledge that always endeavours to point students to major directions; firstly, the direction that points students towards the more academic disciplines of knowledge; then secondly, the knowledge base that students encounter which points them to the skills dimension. This is why workplace is such an integral component of vocational knowledge.

Furthermore, Clarke & Winch (2012) argue that these forms of knowledge are essential for two reasons, p. firstly, the disciplinary component of knowledge is meant to students with knowledge that will enable them to grow beyond their specific immediate workplace or occupation; secondly, workplace knowledge is a component of knowledge that seeks to equip students with broad occupational skills that they will need when they start working in the workplace. Thus, it becomes evident that TVET has a function of equipping ARM students with the skill and knowledge base that will enable them to become highly competent and technically skilled practitioners, who are able to execute their jobs well and equipping them with theoretical knowledge. Theoretical knowledge is essential for ARM students as it assists students to be able to understand the various seasons of change, particularly during this season of technological change and innovation happening. Moreover, this type of knowledge would encourage ARM students to become active participants, who are not just participants but also key contributors within this modern, technology and knowledge-based economy.

Clarke & Winch (2012) contend that TVET Colleges play a pivotal role, in the development of a knowledgeable and highly skilled population that will be able to efficiently contribute to the social and economic development of their country, South Africa in this context. Therefore, it is essential that TVET Colleges ensure that they offer quality educational programs that will provide and equip ARM students with what are deemed as "real world working skills" that are required by both the public and private job sectors (DHET, 2013, p.60). This is mainly because secondary school education does not have the ability to equip students with all the necessary knowledge and skills that students are required to have when they enter the job market, such education does not have "the space nor does it have the capacity to offer students an education that will guarantee them employment" (UNESCO, 2011, p.16). Therefore, equipping students with key skills and knowledge that they will need to become employable, becomes the core responsibilities of TVET Colleges.

In addition to that, it is important to note that not all students who complete high school are eligible to enter universities due to various reasons. With the demand for tertiary education being on the rise in South Africa, that is basically where TVET Colleges come in. According to UNESCO (2011) TVET Colleges have over the years, became the solitary and ultimate way to respond to the growing demands for a workforce that has the relevant theoretical and specifically practical knowledge base. Additionally, UNESCO (2011, p.17) argue that TVET "Colleges play a very imperative role in terms of helping to assist students transition from school to the world of work". This is essentially important as aspect of transitioning that secondary schools and traditional universities battle to mitigate.

There are four main goals that are outlined by UNESCO (2011, p.5) that are associated with TVET Colleges, for the purpose of this study the researcher would like to pay specific attention to these goals as they are in specific connection to what the researcher tries to highlight.

- "to empower individuals and promote employment, decent work and lifelong learning".
- "to promote inclusive and sustainable economic growth".

- "to promote social equity".
- "to promote environmental sustainability".

It is thus argued by UNESCO (2011) that the TVET sector should aim to provide these main goals within its system. Furthermore, Obadara & Adenaide (2009, p.56) argue that the role of TVET sector includes learning spaces that enable students "to acquire the practical skills, the know-how and understanding necessary for employment in a particular occupation, trade or group of occupations or trades". Furthermore, in agreement with UNESCO (2011) Obadara & Adenaide (2009) state that the TVET College education system is an integral part of education and skills development, secondly, these Colleges serve as a means or avenue for preparing for occupational fields for effective participation in the world of work; thirdly, they mention that TVET Colleges are an aspect of lifelong learning and also preparation for responsible citizenship; lastly, they are an instrument for promoting environmentally sound sustainable development and are also methods of facilitating poverty alleviation. Thus, the overall society should become more knowledgeable, and information centred through TVET Colleges.

According to UNESCO (2011, p.6) the success of TVET College roles depend on ICTs. One of the possible means of adjusting the TVET College system, when it comes to the development of human resources, and labour force for this ever-dynamic world of work, requires focus and investment in the integration of ICTs (UNESCO, 2011, p.6). According to Saud, Shu'aibu, Yahaya & Yasin (2011) this integration should be linked to the curriculum particularly in the process of integration, which should mainly focus on teaching and learning in relation to technology. Saud et al (2011) further emphasise the fact that information and technology is increasingly becoming ubiquitous. According to UNESCO (2011) in most countries especially within Africa, the TVET College system is still underestimated. It is often perceived as a second option as opposed to other traditional tertiary institutions like universities, this is one of the biggest challenges that the South African TVET College system face. A key factor that contributes to this type of thinking is the lack of resources that is often found in TVET Colleges (Obadara & Adenaide, 2009).

With all, it is crucial to be aware of the fact that TVET Colleges are not the only core solution to the skill and knowledge as well as unemployment gaps that currently exist in our society. That is essentially because TVET Colleges cannot create jobs, they are simply avenues that can merely assist with equipping students with the necessary skills that they will need to enter the labour market. Yet these benefits can only be noted if the programs that are offered at TVET Colleges correspond with the needs of both the current and future labour markets (Obadara & Adenaide, 2009).

2.2.4 Factors that hinder the use of ICTs in TVET Colleges

According to DHET (2014) in the South Africa context, ICTs were introduced in school as remedies to redress the education system left by the past regime, as an attempt to equalise the education system. However, the goal was not met because lecturers and teachers were not able to use the ICTs and had not being trained extensively to teach using the tools, as such; computers were not used as anticipated. Vinh, Hoa & Binh (2010) hypothesize that one of the key factors that hinder ICT integration in TVET Colleges is indeed the lack of a strict, structured policy and mechanism that encourages, guides and helps to support lecturers in their endeavours to integrate ICTs into their pedagogical practices. This statement is in direct concurrence with the one of the findings that emerged in a study that was conducted by Cross & Adam in 2007 which revealed that "many Higher Education institutions in South Africa do not yet have an existing institutional vision or strategy, at both national and individualistic levels (Cross& Adam, 2007, p.74). Hence, the integration and use of technology and their activities within institutions is limited to somewhat isolated pockets driven by projects.

Thus, this poses a problem because in Higher institutions of learning it is very difficult to have a dichotomous or "one size fits all" approach to ICT integration. Furthermore, White Paper on Higher Education (2013) critique how the policy document does not provide clear directives on how ICT integration should occur within the context of institutions of higher learning, and specifically within TVET Colleges. Thus, it has be noted that the DHET calls for an enhancement in the teaching and learning. Consequently, DHET (2013) has a mandate that requests for enhancement in teaching and learning strategies in order to improve quality of teaching and learning that takes place in higher institutions of learning. Furthermore, DHET (2004) takes on a very techno centric view, which assumes that technology could

enhance teaching and learning practices and support problem solving and critical thinking development. Additionally, Vinh, Hoa & Binh (2010) also revealed that there is lack of financial support and/ commitment from key stakeholders, when it comes to the purchasing and maintenance of infrastructure and other ICT related equipment within TVET Colleges. According to Vinh, Hoa & Binh (2010) this problem is not only limited to infrastructure, it also has an impact on lecturers as there is a lack of funding for capacity building and the training of lecturers, to equip them with the various skills that they will need in order to be able to incorporate different forms of ICTs into their pedagogical practices.

Likewise, Yalcin et al (2011) also suggest that lecturers' pedagogical beliefs are an essential variable that needs to be considered when speaking about integration, as this influences lecturers' use of technology in the classroom. Lecturers' attitudes and beliefs about and toward technology are of great importance in their decisions to adopt and use technology in the classroom. This concurs with what Voogt, Fisser, Paria, Tondeur & Van Braak (2013) who stated that lecturers' beliefs about pedagogy and technology are intrinsically intertwined. On the contrary, Voogt et al (2013) revealed that lecturers might have the necessary knowledge and skills that enable them to use technology and particularly ICTs. However, this ability does not always translate or is not reflected in their pedagogical practices. Furthermore, Voogt et al (2013) posit that lecturers' pedagogical decisions during the preparation and execution stage of their lessons, are based or guided by their own personal pedagogical beliefs about the relation between content and technology and is not necessarily guided by their knowledge of the affordances that technology can bring into the classroom. In addition, Mishra & Koehler (2009) also propose that new digital ICTs are changeable, unstable, opaque, and present new challenges to lecturers, when compared to the more traditional, conventional technologies. This is perhaps one of the main contributing factors that would explain the reason behind the fact that lecturers are struggling to use more technology in their teaching.

Subsequently, DHET (2013) cites that majority of areas of study within TVET Colleges offer institutional workshop learning to students. Which is characterized as a type of learning that can be easily controlled and that is in line with the Vocational Education curriculum. However, Voogt et al (2013) argue that one of the biggest challenges that is revealed with the

education offered in these institutional workshops, is the fact that some TVET Colleges cannot afford to upgrade their workshops with some of the latest ICTs and equipment that is available in the market and that is used in industries. Furthermore, Voogt et al (2013) argues that in some instances, the content as well as skill base that is taught to students in the workshops in TVET Colleges is not always authentic, or in line with real-life, industry-based experiences. Therefore, one of the key tasks that TVET Colleges need to heed to, especially in the programs such as ARM, is ensuring that the training systems (which are mainly offered to students through the workshop sessions) the curricular and what is happening in industry are all aligned.

This would assist ARM students to build connections between various forms of knowledge and skills that need to be learnt in each sphere. Hence, DHET (2014) calls for a partnership between TVET Colleges and potential employers in the planning and designing of curricula within Vocational Education. Furthermore, a study conducted by Summak, Bağlıbel, & Samancıoğlu (2010)cited the following difficulties as possible factors that hinder ICT integration and mentioned, p. lack of technological devices, poor funding for the implementation and maintenance of technology, resistance to change (this could be at state or institutional levels), low levels of computer literacy among the lecturers, technology being misaligned with the curriculum as some of the chief hinderances that impact ICT integration in institutions of higher learning. Additionally, their study also identified factors such as poor training opportunities for lecturers', the lack of a comprehensive vision with regards to how technology should be integrated into learning processes and, lecturer related difficulties such as negative attitudes, beliefs and reluctance towards the use technology as being other factors that hinder ICT integration. Thus, as much as it could be argued about TVET lecturer's incapacity to deliver content, there is a wide range of factors which might be influencing their lecturing strategies such as having limited access to resources.

2.2.5 What is integration and what does the process entail?

According to Badri, Al Rashedi, Yang, Mohaidat & Hammadi (2014) integration can be simply defined as the process of using technology or ICTs effectively and efficiently in all dimensions of the educational process mainly for teaching and learning. For integration to be

possible it requires the necessary infrastructure, curriculum and teaching-learning environments**.** Similarly, Chinien & Boutin (2005, p.11) also allude that "the integration of ICTs in education requires considerable investment in the form of time and resources. Consequently, when planning to integrate ICT in education and training, policy makers should be able to use evidence-based information for making sound decisions". This is a complex process that requires readiness. Moreover, Voogt et al (2013) reveal that success in technology integration and the effective and efficient use of technology in education is habitually depend on lecturers' willingness to adopt, and attitudes toward technology. In addition, Voogt (2013) contends that technology integration does not take place in isolation and postulates that it is positioned, and lecturers need to develop flexibility to incorporate knowledge about students, the institution, as well as have knowledge about the environment to efficiently integrate technology into teaching.

Alaza, Bakar, Hamzah & Asmiran (2012, p.70) state that integration is a dynamic process that requires the consideration of other factors such as:

- Lecturers' skills
- Lectures experience in the field
- Lectures technological competencies or abilities in relation to ICTs usage.
- Lecturers' age as this might have a bearing on the relationship that a lecturer has with technology.
- The lecturers' level of education, training in terms of ICT integration and how to utilize ICTs effectively and efficiently in their pedagogical practices.
- The number and types of ICTs available at the TVET College
- Administration support

In addition to that, Alaza et al (2012) also suggest that the integration of technology in classroom teaching amongst lectures in vocational education is to help transmit, create, store and exchange information. Hence, Alaza et al (2012, p.70) proposes that the integration

process would involve "using instructional software during the teaching process of both practical and theoretical elements of a course, when making presentations and when carrying out several tasks in laboratories, workshops or application services. Thus, it should be noted that technology integration in TVET Colleges is significantly different to that in a normal traditional institution because it requires cautious thinking, and it needs to be done in a manner that is appropriate for the specific vocational subject. Consequently, considering the following for example, the simple usage of a PowerPoint presentation in a practical ARM lesson would not be adequate for the type of knowledge and skills to be acquired. ARM lecturers and their students would require ICTs in the form of "computer aided drawing and design, what is generally known as (CAD), 2 and 3D modelling, simulation products, diagrams, hyperlinked texts, videos related to concepts taught in Engineering" (Alazam et al, 2012, p. 71).

According to UNESCO (2002) ICT integration comes in various forms. Strydom, Wilson & Williams (2005) speak about a four-stage continuum of ICT integration. The four stages that are found in the model are;

The emerging stage

The emerging stage is the beginning infancy stage of integration. Strydom, Wilson & Williams (2005, p.74) argue that this stage is characterized by the purchase of ICTs, typically both hardware and software equipment. According to Strydom, Wilson & Williams (2005, p.74) during this stage, key stakeholders in institutions of learning like the administrators and lecturers are starting to explore the possibilities and the possible consequences that come with using ICTs in the classroom. Thus, lecturers in this phase are characterized as being very grounded and rooted in the traditional, more lecturer centered methods of instruction.

The application stage

The secondary stage in the integration process is application stage. Strydom, Wilson & Williams (2005, p.74) contend that this stage is characterized by the integration of ICTs into the curriculum, institutions in this phase are beginning to develop an understanding of the numerous contributions, affordances that ICTs can have on the learning and teaching process. Additionally, they allude that lecturers functioning within this phase can be seen consciously integrating ICTs in to their pedagogical methods.

The infusion stage

According to Strydom, Wilson & Williams (2005, p.74) the infusion phase of integration is more of the intermediate phase of the process of integration, it involves the integration and embedding ICTs across the curriculum. Strydom, Wilson & Williams (2005) indicate that lecturers in this phase of integration can explore new, innovative ways in which ICTs can change their personal productivity, and professional, pedagogical practices and productivity as well.

The transforming stage

The final stage of integration is known as the transforming stage. Strydom, Wilson & Williams (2005, p.74) posits that at this stage institutions use ICTs to rethink their organizational structures in a creative manner. In addition to that "ICTs become an integral, invisible part of daily personal productivity and teachers' professional practices" (Strydom, Wilson & Williams, 2005, p.74). Furthermore, Mishra, Koehler & Yahya (2007) suggest that lecturer preparation is an essential characteristic of technology integration, it is the genesis of technology integration. According to Mishra, Koehler & Yahya (2007) lecturer training on a general level do not adequately equip them with the kinds of experiences that prepare them to use technology in their classrooms. Additionally, formal standalone IT course work does not equip lecturers with the necessary technological skills that will enable lecturers to integrate technology into their teaching practices. Mishra, Koehler & Yahya (2007) allude that this is because IT coursework lacks an essential piece of pedagogical knowledge that is required by

lecturers to enable them to integrate technology into their instructional processes which is known as Technological Pedagogical Content Knowledge (TPACK). Essentially according to Koehler, Mishra & Yahya (2007, p.741) TPACK "is a dynamic transactional relationship between content, pedagogy and technology". Technology integration requires this specific type of knowledge, because for lecturers to be good and able to integrate technology into their pedagogical practices they need to have the know-how. Furthermore, technology integration in ARM simply understood would mean that ARM lecturers need to adopt the blending of computer or technical related learning activities into their methods of instruction in order to foster the process of knowledge construction.

2.2.6 Pedagogy in the context of TVET

According to Loveless (2011, p.301) pedagogy can be defined as a "relationship, conversation, reflection and action between teachers, learners, subjects and tools". Generally, the term 'pedagogy' tends to be interpreted differently, thus creating misunderstandings to comprehend it. The same can be attributed to pedagogy in terms of TVET. As a result, creating a need to develop a well-grounded and useful theoretical underpinning for vocational pedagogy, consequently providing a certain structure for TVET lecturers. Loveless (2011) further alludes that TVET lecturers should be informed by adequate theory of vocational pedagogy to make best decisions in their designed instructional environments. It further has to be noted that, in order for any form of pedagogy to be effective, it has to communicate to the academic needs of that specific institution. According to Loveless (2011, p.303) the idea of pedagogy is linked to what seems to be a European approach understood as a process which focuses on the planned support for the purpose of learning.

The most important factor about TVET is that the knowledge offered consists of two components, theory, and practice. Gamble (2009) further argues that the most distinguishing feature of a vocational curriculum is that it faces 'both ways' meaning that such a curriculum reflects the interrelationship between learning and work, thereby providing education that is not entirely focused on 'work', but which enables artisans to function effectively in workplaces through an integrated curriculum encompassing both disciplinary learning and workplace practice. According to Maeko & Makgato (2014) the pedagogy being used

currently to teach theoretical elements of vocational subjects are often more traditional, then they tend to be more practical in the workshops. Maeko & Makgato (2014) argue that the relationship between theory and practice aims to provide students with knowledge and skills that will lead them to successfully become artisans needed in the sector. Thus, the notion must be based on problem solving, which requires students to apply both theoretical knowledge and practical skills. According to Loveless (2011) to good pedagogical practices, the integration of ICTs and blended learning can be used to create new learning experiences which are more fluid, interactive and multimodal in nature.

Moody & Wheelahan (2012, p.324) differentiate academic and vocational teaching because vocational lecturers "have a greater role in mediating the social context of vocational education than they have in school and higher education… vocational lecturers are distinctive because they reformulate vocational knowledge from work where it has mainly a productive function to a teaching-learning function, and they make this reconceptualised vocational knowledge comprehensible to others – to students and novice practitioners or workers". Thus, vocational education should not be treated the same way as the general academia, but also requires lecturers to poses an extinguished kind of knowledge.

2.2.7 Forms of knowledge and competencies required for the instruction of ARM

According to UNESCO (2002) "ICTs have the potential to transform the nature of education, where and how learning takes place, and the roles of students and lecturers in the learning process" (as cited in Engida, 2013, p.9). When teaching with ICTs, it is crucial that lecturers are competent so as to be able to use ICTs appropriately and effectively. According to Naiker (2017) ARM lecturers need to possess what is known as professional knowledge. Professional knowledge within the context of TVET lecturers is categorized as specialized knowledge required in enabling an individual to perform a specific type of job. Naiker (2017) argues that it is the knowledge base that distinguishes an ARM lecturer from an engineer. Furthermore, Chua & Jamil (2012) alludes that like in any other profession TVET College lecturers are expected to have specific professional knowledge which includes, p. knowledge of concepts, what is also called content knowledge, knowledge of practical applications of concepts, method to expand knowledge and create new knowledge, additionally such

lecturers also need to have Technological knowledge. Technical knowledge arches and acts as both a form of knowledge and as a competency that is required by lecturers, as it allows them to produce "alternative instructional methods" (Chua & Jamil, 2012, p.1540). Subsequently, technological knowledge also becomes more than a tool that is used to facilitate the process of instruction. It becomes a prerequisite form of knowledge and competency that all lecturers in TVET Colleges need to have.

Naiker (2017) further alludes that the kind of knowledge ARM lecturers need is a type of knowledge which comprises of the understanding of high-tech machinery and specialized technical equipment. Chua & Jamil (2012) argue that modules in TVET Colleges (ARM being one of them) encourage practical training that requires high technological knowledge because of the hands-on component that focuses on building practical experience and on promoting collaboration. It can be noted that blended learning emphasizes the importance of technological knowledge and this competency is the highest dimension of knowledge that ARM lecturers need to master, to be able to integrate ICTs into their pedagogical practices. Naiker (2017, p.8) proposes that ARM lecturers need to be specialists in "technical curriculum delivery who possess knowledge that is related to this specific occupational field". Thus, blended learning will serve as a tool that lecturers can use to know what is required of them and the type of instruction needed to meet objectives and goal in their lessons.

2.2.8 What is Automotive Repair and Maintenance as a module within the context of TVET education?

Within TVET Colleges, there is a wide range of Vocational courses offered in different levels, which enable students to acquire NC (V) qualifications. These courses, just to mention few, include, but not limited to; Civil Engineering and Building Construction, Electrical Infrastructure, Engineering and Related Design, Hospitality, Information Technology and Computer Science, Tourism. With specific reference to Engineering and Related Design (ERD), in most TVET Colleges, this would be the main NC (V) course where ARM, is situated. The table below outlines the NQF levels of ERD by DHET (2017).

Table 2.1: ERD course structure (Source: DHET, 2017)

Level 2	Level 3	Level 4
• Engineering Fundamentals • Engineering Technology • Engineering Systems **And one of the following** ▪ Welding ▪ Fitting & Turning ▪ Automotive Repair and Maintenance	• Engineering Practice & Maintenance • Material Technology • Engineering Graphic Design **And one of the following** ▪ Welding ▪ Fitting & Turning ▪ Automotive Repair and Maintenance	• Engineering Processes • Professional Engineering Practice • Applied Engineering technology **And one of the following** ▪ Boiler making ▪ Fitting & Turning ▪ Automotive Repair and Maintenance

ARM is one of the elective vocational modules offered in ERD, it is offered from NQF level 2 to NQF level 4, however for the purpose of this research, and concentration shall be only on level 3 and 4. According to Naiker (2017) ARM is a module programme which is offered alongside or in conjunction with other vocational modules. In level 3 and 4, ARM is offered along these compulsory vocational modules, namely, Engineering Practice & Maintenance (EPM), Material Technology (MT), Engineering Processes (EP), Professional Engineering Practice (PEP), Applied Engineering Technology (AET) and Engineering Graphics and Design (EGD). Naiker (2017) further argues that the predominant long-term goal with this module is to equip students with all the necessary knowledge and skills that they will need to enable them to execute tasks and meet requirements as set by industries, the workplaces that that they want to get into once they are done with their studies. In addition to that, ARM enables students to be more self-reliant and marketable. ARM is offered as a full year module that comprises of 200 hours of learning and teaching, which consist of both theoretical as well practical components. In terms of weighting for marks the theoretical component counts 40% and the practical counts 60 % (guidelines doc, 2007 as cited in Naiker. 2017, p.26).

Naiker (2017) argues that ARM focuses on providing students with a type of knowledge that is known as special vehicle maintenance knowledge. DHET (2016) further alludes that ARM in terms of its content specifically looks at automotive transmission, fuel injection, computer electronic system, body construction, and the characteristics of specialised automotive systems. Thus, in the module students are taught how to identify and explain these systems in terms of their properties and functions, they are also required to identify common problems occurring within the system are identified in terms of how they manifest (guidelines doc, 2007 as cited in Naiker. 2017, p.26). Furthermore, students are also taught to give solutions to the problems they have identified and how to address them according to manufacturer's specifications. Moreover, they are also taught to ensure that the solutions that they provide and the work that they conduct are in accordance with workplace safety requirements and current legislation (guidelines doc, 2007 as cited in Naiker. 2017, p.26).

Within the broader educational space, this subject aims to acquaint students with basic knowledge of vehicle technology. It also seeks to equip them with the necessary skills and confidence that they will require enabling them to perform tasks related to working with the various components of a vehicle, engines, gearboxes, fuel systems, body components and electronics. According to Naiker (2017) these tasks are mainly restricted to the removal, cleaning, servicing (replenishing of fluid) and fitting. Students who successfully complete this subject can progress and study towards another qualification. In addition to that, students with knowledge in this subject can also progress to a stage that enables them to assist other students to understand the specialised jargon that is used in the manufacturing and assembly industry (guidelines doc, 2007 as cited in Naiker. 2017, p.26). Naiker (2017) argues that students who study ARM are also taught the crucial skills, such as being able to recognize faults and solve various problems related to the automotive field. For students to be able to achieve this they will be expected to work effectively, individually and in teams to record the requirements to fix faults, using the communication and writing skills that are utilised within ARM.

2.3 THEORETICAL FRAMEWORK

As the study sought to explore ARM lecturers' instructional methods towards blended learning, the theoretical framework adopted by the study was the professional knowledge framework proposed by Mishra & Koehler (2006) known as Technological Pedagogical Content Knowledge (TPACK). The TPACK framework emphasizes "Technological Knowledge (TK) and technology integration in the whole process of teaching and learning is most important, TPACK is an expansion to the Pedagogical Content Knowledge (PCK) model by Shulman (1987)" (Naiker, 2017, p.9). According to Mishra & Koehler (2008) teaching with technology is an overlap between subject matter content, technological knowledge and pedagogical processes used by lecturers in their endeavour to promote student learning. TPACK was used in the study to assist the researcher to establish the relations between the various forms of knowledge that a lecturer is required to have in order to enable ICT integration in a classroom. According to Mishra & Koehler (2006, p.33) TPACK was derived from Pedagogical Content Knowledge model presented by Shulman 1986. The figure 2.2 is the representation of PCK model by Shulman (1986)

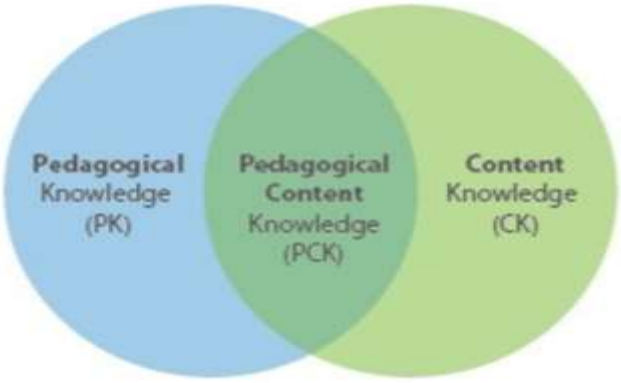

Figure 2.2: The Pedagogical Content Knowledge Model (Source: Shulman, 1987)

Mishra & Koehler (2006) argue that Shulman had not considered technology knowledge as irrelevant in his work in 1986; instead he identified teacher knowledge about educational technologies under "curricular knowledge" domain. Furthermore, Mishra & Koehler (2006) argue that Shulman (1986) puts emphasis on the significance of knowledge regarding technologies that can be used in a precise subject matter area by including words such as

"software" and "programs"… "Shulman's focus was mainly on how pedagogy and content are related in teaching since technologies before 1980s had become obvious after they were routinely used in the teaching process" (Bruce & Hogan, 1998, p.281). Using Shulman's strategy, Mishra & Koehler (2006) introduced a third component to the PCK model and came up with Technological Pedagogical Content Knowledge (TPACK). The name TPACK "embraced the idea that pedagogy, content and technology should not be treated separately from each other but should be considered as a whole for good teaching with technology" (Thompson & Mishra, 2007, p.64). TPACK is the knowledge of integrating the use of technology, pedagogy, and content at the same time in a lesson. With that being said, for this study, lecturers' TPACK was the focus as this helped to explore their attributes of TPACK in ARM.

TPACK model was acquired by the study as a foundation to explore how lecturers integrate the use of technical equipment into the process of instruction. Looking at how the automotive industry has improved, vehicles nowadays rely on hi-tech electronics for controlling most systems in the car, from the engine management (Push-start button is installed, keys are no longer used to turn on the ignition) to entertainment systems and climate control (car detects the temperature that suits the driver e.g. if it's cold outside the car switches the heater on and vice versa). Ndzoyiya (2019, p.76) asserts that this means auto technicians need to understand both the mechanical systems in vehicles and the electrical or electronic systems. He further argues that these technicians need to develop diagnostic abilities that will enable them to perform problem solving (repair and maintenance) in any vehicle.

For effective teaching and making sure that students leave TVET College with sufficient knowledge, lecturers need to be armed with instructional skills that accommodate modern and recent conditions in terms of how the automotive industry has advanced and the "teaching resources have to be specifically designed to allow the creation of a technology-based / infused training" (Naiker, 2017, p.8). According to Naiker (2017, p.11) lecturers' technical skills should include effective use of innovative instructional strategies such as the use of simulators, electronic training boards in order to teach certain topics. ARM lessons involve a lot of hands-on application with regards to structuring experience and promoting an alliance within lecturer and student as well as within students themselves.

The use of ordinary teaching aids such as textbooks, periodic charts, maps and others can be regarded as material that is apparent in traditional classrooms. The way lessons are presented has progressed, more especially in modules like ARM, digital technologies can be utilized in classrooms to enhance understanding and how information is presented. Most TVET Colleges have the use of digital learning technologies such tablets, smartboards, educational simulations, web based learning sites and etc. with such tools, lecturers already have an advantage because students in our classrooms are intrigued and are so interested in technology and "proper instruction requires the understanding of how technology is related with pedagogy and content" (Mishra & Koehler, 2006). Mishra & Koehler suggested that TPACK "specifically focuses on the interrelationship among pedagogy, content, and technology to build up a common language among scholars and allow systematic research of technology integration to teaching" (Mishra & Koehler, 2006, p.1021). The total educational package of TPACK is represented in Figure 2.3.

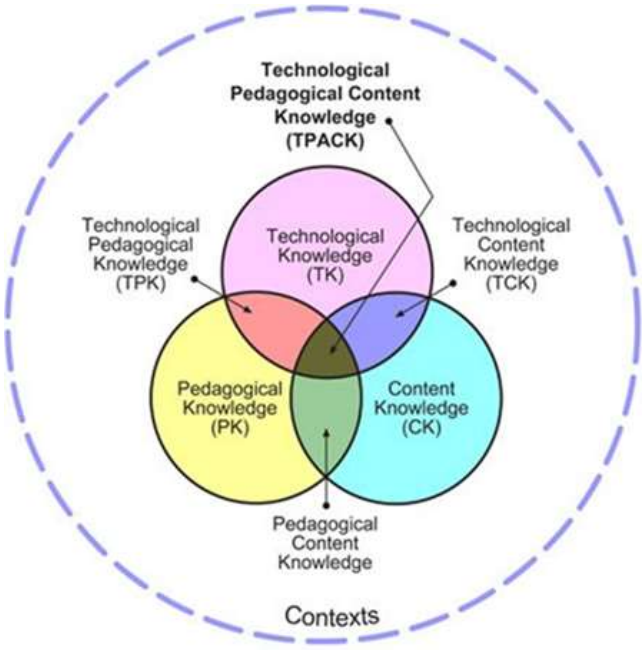

Figure 2.3: Technological Pedagogical Content Knowledge Framework

(Source: Koehler & Mishra, 2009)

The TPACK model above "was proposed to consist of seven sub-teacher knowledge domains namely: Content Knowledge (CK), Pedagogical Knowledge (PK), Pedagogical Content Knowledge (PCK), Technology Knowledge (TK), Technological Content Knowledge (TCK), Technological Pedagogical Knowledge (TPK), and Technological Pedagogical Content Knowledge (TPACK)" (Baran, Chuang & Thompson, 2011, p.371).

Content knowledge (CK) refers to the knowledge about the subject matter (Koehler & Mishra, 2009, p.60). In this study CK refers to knowledge about ARM in the discipline Engineering and Related design. This type of knowledge is independent of any other pedagogical considerations (Cox, 2008, p.66). It includes the knowledge of facts, procedures, principles and theories in one's subject matter area (Mishra & Koehler, 2006, p.1017).

Pedagogical knowledge (PK) refers to "general skills, beliefs, and knowledge related to teaching, independent of a particular subject area. Knowledge and beliefs about students, basic principles of instruction, classroom management, and the aims and purposes of education are all part of general pedagogical knowledge" (Cox, 2008, p.7).

Technological knowledge (TK) refers to the knowledge about various technologies, ranging from low-tech technologies such as pencil and paper to digital technologies such as the internet, digital video, interactive whiteboards, and software programs. It requires lecturers to have "a deeper understanding and mastery of information technology for information processing, communication, and problem solving (Jaipal & Figg 2010, p.418). Lecturers need to be able to adapt to changes relating to technology in order to have developed an understanding of working with technology and its various tools as means of recognising when technology can promote educational achievement or hinder it.

Pedagogical content knowledge (PCK) refers to the understanding of "the most useful forms of representation of content, the most powerful analogies, illustrations, examples, explanations, and demonstrations, in other words, the ways of representing and formulating the subject that make it comprehensible to others" (Shulman, 1986, p.9). Pedagogical content

knowledge differs across different subject areas since it combines both pedagogy and content to lead to better teaching of that content (Schmidt, Baran, Thompson, Mishra, Koehler & Shin, 2009, p.145).

Technological content knowledge (TCK) is the knowledge of technologies specific to a content area. Cox (2008, p.60) states that technological content knowledge is the knowledge of appropriate technologies that may be utilised in each discipline and how the use of those technologies transforms the content of that discipline through representation or the generation of new content or how the content of that discipline transforms or influences technology. It is the knowledge of (a) how technology represents content, (b) how technology generates new content, and (c) how content transforms technology (Cox, 2008, p.60).

Technological pedagogical knowledge (TPK) is the knowledge of the pedagogical use of technologies independent of any content. It refers to the knowledge of affordances and constraints of technologies that can be used in general pedagogical context. It includes the knowledge of how those technologies' affordances and constraints affect or are affected by pedagogical choices of a teacher (Cox, 2008; Koehler & Mishra, 2009; Mishra & Koehler, 2006).

Technological pedagogical content knowledge (TPACK) is the knowledge of using technology, pedagogy, and content at the same time in the same context. Cox (2008) describes TPACK as the knowledge of the dynamic, transactional negotiation among technology, pedagogy, and content and how that negotiation impacts student learning in a classroom context. The essential features of TPACK are (a) the use of appropriate technology (b) in a particular content area (c) as part of a pedagogical strategy (d) within a given educational context (e) to develop students' knowledge of a particular topic or meet an educational objective or student need. This definition acknowledges the presence and interaction of all three components with particular emphasis on the use of content-dependent pedagogy (Cox, 2008, p.65).

The TPACK lens offers a way for lecturers to begin looking at how these elements are currently covered and how they would need to be transformed to specifically enhance the instructional issues related to technical vocational education, hence meeting the needs of TVET ARM students entering the 21st century working world. Thus, keeping that in mind to use TPACK as a lens to highlight lecturers' competency in the process of instruction of ARM, the researcher decided to look at how ICTs are currently integrated in practice and the lecturers' roles and expectations in the integration and implementation process. However, not the whole competencies of TPACK were used. Competencies chosen that formed basis in achieving the aim of the research were CK, TPK and TCK which shall be discussed in depth during data analysis and interpretation. Lecturers' CK, TPK and TCK are measured in the data collection process to understand the integration of blended learning in the instruction of ARM at TVET Colleges.

2.4 CONCLUSION

The purpose of this chapter was to present literature surrounding the study which was relevant in gaining and overview in relation to the research question: What are the challenges TVET College lecturers' face in the instructional practices of NC (V) Levels 3 and 4 Automotive Repair and maintenance concepts? The background relating to blended learning, TVET lecturers and their pedagogy, ARM as a module, ICTs and their impact in TVET was touched on. The literature reviewed the frameworks related to teaching using ICTs. The major framework used in this study was the TPACK framework. The framework was used as it allows lecturers to assess the degree of technology integration and make judgements on how to best use ICTs in their classroom.

Moreover, in relation to TPACK, blended learning suggests that it is important to have a combination of online learning and the presence of the lecturer, thus the knowledge and pedagogical practices of TVET lecturers needs to be explored in relation to that. It is important to determine to what degree lecturers' pedagogical practices impact on their use of technology. The literature reviewed on lecturers' competencies and pedagogies highlighted that TPACK is more than simply adding ICTs into traditional approaches, same sentiments can be attributed to blended learning. Lecturers' competence and wiliness to use ICTs

towards blended learning serve as a driving force in enabling effective and success during the process of instruction. From the literature review, successful integration depends on the level of knowledge of how to use ICTs and the lecturers' ability to link it into the subject matter. Furthermore, the lecturer needs to have an adequate understanding of how ICT can support and enhance ARM in practice. The next chapter outlines the research design and provides a detailed account of the methods employed in the gathering of data.

CHAPTER 3: RESEARCH DESIGN AND METHODOLOGY

3.1 INTRODUCTION

This chapter provides insights into the research design and the methods that were utilised in the gathering and analysis of data as means of answering the research questions.

3.2 RESEARCH DESIGN

According to Scott & Morrison (2006, p.58) the design of a research plays an important role in shaping the researchers research as it often acts as a blueprint that outlines the procedures that the researcher would be undertaking when conducting their research as means of investigating and providing answers to the research problem. Furthermore Creswell (2009) argues that research design refers to the plan or proposal in which the research will be conducted. Thus, research design involves "the intersection of philosophy, strategies of inquiry and specific methods" (Creswell, 2009, p.5). Creswell (2009) highlights that the researcher's intent is "to make sense of (or interpret) the meanings others have about the world. This study adopted a case study as its design to gain an in-depth analysis as means of developing an understanding through finding out how effective instructional processes were achieved when and if blended learning is integrated in ARM.

Competencies of the TPACK framework were used as a lens in order to understand the manner in which ICTs are utilised in aiding blended learning, if they were, in an attempt to highlight their effectiveness in the instructional processes in ARM. The motive behind choosing a case study was due to reasons that the research pursues to understand participants' views, opinions and actions in relation to ARM and the impact or use of ICTs in the preparation or instruction of ARM as means of highlighting the good practices towards blended learning which can be adopted going forward.

3.3 RESEARCH PARADIGM

Mackenzie & Knipe (2006) argue that a research paradigm is "a worldview perspective, or thinking, or school of thought, or set of shared beliefs that informs the meaning or interpretation of data" (as cited in Kivunja & Kuyini, 2017, p.26). Kivunja & Kuyini, (2017) further allude that a research paradigm also influences the data collection techniques and data analysis. Research paradigm chosen for this study is interpretivism. Interpretivism was appropriate for this study due to reasons that "it allows the researcher to observe, analyse and interpret the behaviour based on the researcher's understanding" (Gage, 1989, p.5). According to Myers (2008) interpretivism (also known as interpretivist) compels researchers to interpret elements of the study, as such, there should be a human presence in the study. In addition, Williams & May (1996) indicate that interpretivism focuses on the meaning and may employ multiple methods in order to reflect different aspects of the issue.

According to Chalmers (1987) what individuals observe or see when viewing a picture frame of some sort, rests on their understanding of knowledge of an occurrence over active participation or being exposed to it. In simpler terms, all that we observe, we tend to make judgements or structure our viewing based on our very own experience. "The effects on people's action of their interpretations of their world create the possibility that people may differ in their responses to the same or similar situations" (Gage, 1989, p.5). Therefore, we can observe the same thing but the way in which we might interpret it would not be the same. Additionally, the way in which lecturers would structure or construct their own meaning of events varies; same goes for their methods of instructions. Consequently, Gage (1989) argues that these 'conditions of meaning' emerged just after positivistic and behavioural research hit a wall or was doomed to failure as he puts it, through interpretive research on teaching.

Thus, interpretivist research on education assists in examining "the conditions of meaning created by lecturers as a basis for explaining the difference among students in their achievement and morale" (Gage, 1989, p.5). According to Williams & May (1996) interpretivism assert that for a comprehensive understanding of the classroom, one needs to have an understanding of the goals behind what the lecturer's objective is for taking a certain action and as well understand the rules that govern the classroom. In the same manner,

understanding the reasons behind lecturers' decisions, action and the way they operate, one would need to understand what the main or end goal is, that the lecturer wants to archive. Basically, one needs to essentially have a logic understanding of what the objectives of the lecturer is, in terms of the rules that govern the classroom activities for him to understand what happens in an ARM classroom. Interpretivism enabled the researcher to collect qualitative data and use interviews to provide the required information. Interpretivism further assisted in interpreting results on how ARM lecturers effectively integrate digital technology in their process of instruction towards blended learning.

3.4 RESEARCH METHODOLOGY

This study made use of qualitative research methods approach due to the purpose that the research was structured into exploring the lecturer's integration of ICTs into the instruction of ARM. According to Green (2007, p.2) qualitative methods generally aim to understand the experiences and attitudes of people involved in the study, it may be a community of people or an individual who might be relevant to the research. As a result, the study was aimed at ARM lecturers in order to explore their perspectives as well as to "explore the meaning they give to the phenomena and understand a process" of instruction in depth (Green, 2007, p.7). Furthermore, Green (2007, p.7) argues that qualitative research methods offer visions to different problems and helps in developing concepts or theories for potential quantitative research, with analysis to look deeper into problems, the qualitative approach helps to discover new thoughts and individual views. Additionally, Patton & Cochran (2002) argue that qualitative methods aim to answer questions about the '**where**' '**what**', '**how**' or '**why**' of a phenomenon occur, rather than '**how many**' or '**how much**'**,** which can be answered through the use of quantitative methods. This notion was integrated in the study through the interview questions.

In contrast, Hyde (2000, p.83) argues that one feature that sets qualitative research methodologies apart from quantitative research is that "the modus operandi of qualitative research is to describe the general characteristics of a population as opposed to providing detailed individualistic accounts of participants involved in the study" thus, qualitative data should produce a wealth of detailed data from a small pool of participants. Furthermore,

Hyde (2000, p.83) posits that the findings from qualitative data, suggest that a researcher who embarks on qualitative data collection commences their data collection "with an open mind that is open to the perspectives of the subjects". The methods used in qualitative studies regularly make use of traditional methods that are based on open ended observations, interviews, sound, emails and other emerging forms of data collection. In addition to that, qualitative research is essentially interpretive in nature and requires the researcher to interpret the data collected, to make sense of it. The study used qualitative research methods approach due to the purpose that the research is structured into exploring the lecturers' integration of blended learning into the instruction of ARM. Issues related to challenges faced by lecturers during integration were also explored.

3.4.1 Method of collecting data.

For this study, semi-structured telephonic interviews (open ended) were used with the aim being to probe the lecturers' insight in their challenges and successful traits in ICT integration towards blended learning. Marshall & Rosseman (2011) argue that qualitative researchers rely quite extensively on in-depth interviewing. According to Kvale & Brinkmann (2011, p.142) interviews enable researchers "to understand the participants by exploring their views and opinions" this enabled the researcher to get a better grasp of what TVET lecturers face on daily basis in practice. The purpose of interviews is to develop a deeper understanding of ARM lecturers' TPACK and obtaining rich, thick descriptions of lecturers' knowledge. A wide range of topics was used for the interview instead of a structured list of questions (Mason, 1996). Opie (2004) & Descombe (2007) argue that semi-structured interviews provide more data because of the flexibility that participants have in giving answers. An open-ended interview gave space for the participants to express their views about ARM and its instruction. Semi-structured open-ended interviews allowed the researcher to go deeper into finding more information from the interviewees using probing and follow-up questions which could help to provide more understanding of what the interviewees were saying (Descombe, 2007, p. 53 & Opie, 2004, p. 12 as cited in Block & Erskine, 2012, p.22).

Telephonic interviews were adopted due to their two most obvious benefits, cost effectiveness and time efficiency (Cannell, 1985; Dinham, 1994; Sarantakos, 1998; Taylor,

2002 as cited in Block & Erskine, 2012, p.28). Telephonic interviews give researchers access to varied resources and experiences without the need to endure the expense and time consumed by travel to different locations. Thus, it is possible to interview individuals who may not otherwise be available due to their location. The cost savings of conducting research by telephone in United States of America history has been estimated at fifty to seventy-five percent of face-to-face interviews (Marcus & Crane, 1986; Worth & Tierney, 1993 as cited in Block & Erskine, 2012, p.28). Lastly, telephonic interviews were adopted due to the issue which we are facing as the world, the COVID-19 pandemic. This was a better alternative for safety reasons and restrictions surrounding the virus.

3.5 POPULATION AND SAMPLING

According to Cohen, Manion & Morrison (2000, p.2) the quality of research not only stands or falls by the appropriateness of the methodology and instrumentation used, but also by the suitability of the population and sampling strategy that has been adopted.

3.5.1 Population

Gorard (2001) defines population as the group one wishes to study. According to Mertens (1998) "a population is a group to which the researcher would like the results of the study to be generalized…a population entails the total collection of individuals who are potentially available for observation and who have the attributes in common to which the research question refers" (as cited in Khoza, 2013, p.48). Creswell (2003) acknowledges that the idea behind qualitative research, in regard to population, includes purposefully selecting sites and population that is empirical for the study and can help the researcher in understanding and addressing the research phenomenon. Qualitative research allows the researcher to conduct research in sites of interest and if "they do not disturb the site any more than is necessary" as the participants involved in the study are lecturers within the College setting (Creswell, 2003, p.181). The researcher ensured that they "build rapport and credibility with the individuals in the study" (Creswell, 2003, p.181). Thus, with regards to the population for the study, three TVET Colleges in Gauteng that offer Automotive Repair and Maintenance were chosen. The

names of the colleges were pseudo coded as College A, B and C to hide their identity and bellow is an overview of these Colleges

TVET College A

This College is situated in Johannesburg, in Gauteng province. The College has four lecturers who teach ARM and all of them taught ARM from NC (V) level 2-4 and in different classes as the institution is immense.

TVET College B

This College is also situated in Johannesburg. This College has three lecturers who teach NC (V) level 2-4, each lecturer was focused on his/her own level; there was a lecturer for level 2, a different one for level 3 and another different lecturer for level 4.

TVET College C

College C is situated in the Gauteng province in Roodepoort. This College has four ARM lecturers and two teach NC (V) level 2; whereas the other one offered NC (V) level 3, and the other offered NC (V) level 4.

3.5.2 Sampling

Sampling refers to the "activities involved in selecting a subset of persons or things from a larger population" (Scott & Morrison, 2006, p.219). Mertens (1998) explains sampling as "a process of selecting a given number of individuals for a study in such a way that the individuals represent the larger group from which they were selected" (cited in Khoza, 2013, p.48). The purpose of sampling is to use a relatively small number of cases to find out about a much larger number (Gorard, 2001). Furthermore, the "methods used to select the sample will determine the nature and validity of the findings that are generated from the study of that sample" (Scott & Morrison, 2006, p.219) and these influenced and shaped the purpose of the research. With, two lecturers per College who offer NC (V) level 3 and 4 were purposefully selected to take part in the study. Thus, purposive selection was used to select a total of six lecturers who offer ARM from the three TVET Colleges. From College A, only two lecturers were selected due to their vast experience offering ARM and from College B, the lecturers offering NC (V) level 3 and 4 were selected. Furthermore, from College C, one lecturer offering ARM in NC (V) level 3 and another one offering NC (V) level 4 were selected. The sample includes a total of 6 participants, 5 males and 1 female, with varied ages. The participants are explained further in detail in chapter 4.

3.6 DATA COLLECTION TECHNIQUES

According to Creswell (2003) failure to identify and use the appropriate instrument for the collection of data, could negatively impact the findings generated by the research. The study focused on a sample of three pilot TVET Colleges that offer Automotive Repair and Maintenance within the Gauteng province. The data was collected using semi structured telephonic interviews (open ended) with the lecturers offering the module, to probe the lecturers' insight in their challenges and successful traits in ICT integration.

3.6.1 Semi-Structured Telephonic Interviews

Kvale (1996) argues that even though qualitative research does rely on observations, however it relies quite extensively on interviews. Kvale (1996, p.2) describes qualitative interviews as "a construction site of knowledge" where two (or more) individuals discuss a "theme of mutual interest" (Kvale & Brinkmann, 2009, p.2 as cited in Marshall & Rossman, 2014,

p.142). The research interviews of this study focused on issues related to interviewees' views on lecturers training, competencies and ICT skills development, experiences and competencies of instructing ARM and ICT integration and lecturers' pedagogies. The study made use of open ended semi-interviews, which enabled the researcher to formulate and ask questions "that are more carefully "scripted", asking specific questions in a specific sequence, sometimes without a follow up" (Marshall & Rossman, 2014, p.144).

The semi-structured interviews focused on several issues; including the interviewee's views about the use of ICTs during lectures, how ICTs aids or hinders teaching and learning within the module; the skills and knowledge that lecturers must have to be able to use and integrate ICTs in the classroom. Thus, interviews were conducted to produce data about the teaching practices, as well as processes related to curriculum delivery and implementation. In preparing for the interview the researcher carefully crafted questions in their order (as shown in Appendix A) to flow as a natural conversation. These questions were limited to 11, so that the lecturers do not find them ambiguous during the interview. The researcher contacted the TVET Colleges and got hold of the lecturers a day prior to the interview and emailed them the interview schedule. This was done so that lecturers have time to read and understand and could ask the researcher to clarify some questions where necessary to avoid answering questions without understanding while still accepting that people may have different meanings for one question (Opie, 2004, p.12)

All calls were put on loudspeaker, the interviews were audio recorded with the permission of the participants and transcribed for analysis purposes. The interviews time frame ranged between 8-13 minutes, this depended on the rate which the participant answered and where the researcher would want to get more information in relation to the question. The interviews aimed to get the lecturers' experiences to locate the researcher in being a part of the instructional experience that the lecturers go through in their lecture rooms. The interviews allowed the participants to highlight their strengths and weaknesses in implementing and using ICTs towards blended learning which contributed to effective instructional methods within ARM. The interviews were designed in a way that allowed the researcher to get insight of the practices that ARM lecturers adopt during lectures.

For the actual interview, the researcher welcomed each respondent and gave an introduction of what could be expected in the whole process and introduced himself. The researcher also set some ground rules in terms of what was expected of them and that they were free to ask follow-up questions in case the need arose. The researcher thanked all participants at the end of the interviews and promised that he would email scripts with themes to be sure if the data represented them. The anonymity of the entire process was also guaranteed. Marshall & Rossman (2014, p.144) assert that an interview is a suitable instrument for eliciting information from the participants' ideas, so in this study the interviews helped to access TVET lecturer's ideas about teaching ARM, the strategies they use and reasons for choosing certain methods when teaching the Module. This instrument addressed RQ1 and 2 (refer to section 1.6.1). This instrument was mainly chosen because it was more appropriate and leaned towards the kind of data the study sought to collect.

3.7 DATA ANALYSIS

Creswell (2003) asserts that data analysis involves preparing the data for analysis, conducting different analysis, moving deeper and deeper into understanding the data, representing the data, and making an interpretation of the larger meaning of the data. The researcher needs to be able to interpret and make sense of the data that they have collected using instruments that will help them analyse the data. According to Patton & Cochran (2002) thematic analysis seeks to look across all the data that has been collected and identifies all the common issues that recur from that set of raw data, it is usually applied to a set of texts such as interview transcripts. Furthermore, thematic analysis identifies main themes that summarize all the views that have been collected by a researcher "this is the most commonly used method to analyse descriptive qualitative research studies" (Patton & Cochran, 2002, p.236).Once all the interviews were conducted with the participants, the researcher listened to the recorded interviews several times to make sure that he does not omit anything important the participants might have said and transcribed them onto a word document. Once, the transcription was completed the researcher did a two-way check, this process involved reading through the transcripts whilst listening to the recorded interviews to ensure that the final transcripts were accurate and that they correlate with what was articulated in the recordings.

Once the transcripts were completed, the researcher started a detailed analysis with a coding process. "Coding is the process of organizing the material into chunks or segments of text before bringing meaning to data" (Rossman & Rallis, 1998, p.171 in Creswell, 2008, p.184). The coding process involved annotating transcripts and identifying codes, the researcher focused on reading the data in detail and identifying all the codes that are present in the data and was grouped into chunks. Thereafter, a sequence of recurrent themes was extracted in relation to the framework presented in the literature review. The interview questions were inter-related to each other, to the research questions and to what the study aimed to find. Consequently, six themes emerged and were shaped by the nature of research questions and the questions that were asked during the interviews. The themes that emerged are presented and discussed in chapter 4 under data presentation and discussion.

3.8 ETHICAL CONSIDERATION

According to Green (2007) ethics can be understood as the branch of knowledge that deals with moral principles which govern a person's behaviour or the conducting of an activity. Ethics was properly followed when conducting this study. Ethics form was completed and submitted for approval from the university ethics committee, another form was sent to the selected chosen TVET Colleges. Thus, permission to collect data was sought and granted from the university (refer to Appendix F for clearance certificate), the executive committees of the selected institutions (refer to Appendix G-I) and the participants (refer to appendix C).

The researcher decided with the lecturers with regards to their availability, then lecturers gave the researcher their availability time slots, and specific times were chosen by both parties suitable for the lecturers. Thus, the lecturers were guaranteed that the researcher will not interfere with the process of teaching and learning in any way and the lecturers were consulted about their availability and the lecturers gave convenient times for the researcher to call them to conduct interviews. Therefore all "participants in this study freely consented to participate, without being coerced or unfairly pressurized" (Green, 2007, p.5). Participants (lecturers) were knowledgeable regarding what contributing to the study involves and were

reassured that refusing to participate in the study will not have an effect on them in any services they receive, and that they could pull out their consent at any time for the period of the study without any penalty. It was made clear to the participants that there were no predictable hazards in contributing to the study and that they will not be paid for the research.

3.9 TRUSTWORTHINESS AND HONESTY

Green (2007, p.5) asserts that with regards to confidentiality "it is not always easy or even possible to measure the dangers of a certain context to a given population, let alone to individuals". With that being said, the researcher took it upon himself to explain to participants that their identity and that of the College was to be protected. The researcher affirmed to the participants that their responses would be kept confidential and anonymous; they were further assured that their confidentiality would be upheld in all printed and written data subsequent from the study. It was also explained to the participants that all the data was to be saved in a password protected laptop and would be destroyed after 3-5 years.

3.10 VALIDITY AND RELIABILITY

According to Scott & Morrison (2006, p.208) Validity in research concerns itself with questioning the accuracy of the research findings and how they were obtained, whereas reliability is used as a measure of quality… the key to successfully applying a notion of reliability is that the object being measured remains stable. Thus, for reliability, the researcher checked the transcripts several times to be certain that they did not comprise of evident errors that could have been done during transcription. Furthermore, the researcher made sure that there is no drift in the definition of codes "a shift in the meaning of the codes during the process of coding" (Gibbs, 2007 cited in Creswell, 2008, p.190). This was done through constantly comparing data with the codes.

For validity, the researcher used member checking proposed by Gibbs (2007) to determine the accuracy of the findings (as cited in Creswell, 2008, p.190). The researcher e-mailed the final report and descriptions of themes to participants to determine whether they feel that the

themes are accurate, it was not the raw transcripts that were sent for checking; instead, the researcher sent parts of the polished product of the themes and data. Thereafter the participants were provided an opportunity to comment on the findings, researcher waited for the participants to confirm if the findings represented them or not. Consequently, the participants felt that the findings represented what they wanted to project.

3.11 CONCLUSION

This chapter presented the research design that was adopted by the study as means of answering the research question. It also outlined the conventions of research concerning methodology. Interpretivism paradigm and qualitative research methods along with telephonic interviews as methods of data collections were discussed in detail as mean of outlining the problems faced by the research. Finally, the chapter illustrated how it maintained the participants consent and confidentiality. Chapter 4 presents the analysis and interpretation of data.

CHAPTER 4: DATA ANALYSIS AND PRESENTATION OF RESULTS

4.1 INTRODUCTION

This chapter provides data findings, analysis and interpretation of data that was collected through telephonic semi-structured open ended interviews as means of understanding lecturers' views and their instructional practices. The data collected was analyzed to provide answers to the problem and research questions outlined in chapter 1 of this study. These questions were essential and were understood as "statements of questions being examined in the study in their most general form" (Creswell, 2003, p.105). From the literature that was reviewed in the study and through the collection of data; the researcher was able to develop an understanding of the competencies needed to be developed by TVET lecturers in incorporating and implementation of ICTs in their instructional methods. The chapter provides a brief description and information of the participants; it further presents data and its analysis. Furthermore, themes that emerged from the telephonic interviews are presented. According to Creswell (2003) this all contributes to the researchers' ability to be able to report accurately the findings and their relevance to the study. The next section presents the participants' information:

4.2 PARTICIPANTS BIOGRAPHICAL DATA

According to Marshall & Rossman (2011) the researcher makes selection of sites and samples of times, places, and participants to study, this then makes the research site and its participants to be important elements in a research.

4.2.1 The setting of the study

The study was conducted in three different TVET colleges within Gauteng province (GP). The TVET colleges are situated in two different areas, two in Johannesburg (College A and B) and one in Roodepoort (College C). The data presented in this study does not reveal any identities of the participants and the institutions as means of maintaining and respecting

participants' confidentiality and protecting the reputations of the participants and their institutions. Below is a more detailed account of the colleges' demographics and lecturers' biography:

Participants' profiles

The table below presents a detailed outline of the ARM lecturers who were participants of the study. Their information, including qualifications, age, post-level and their years of experience are presented.

Table 4.1: TVET College lecturers' profiles

Lecture	Gender	Post level	Age	Qualification	Lecturing experience in years	NC (V) level taught	College
1	Male	1	46	Advanced Certificate in Education (ACE) and a trade	6	2-4	A
2	Male	1	34	National Diploma in Education with no trade	8	2-4	A
3	Female	1	30	B Tech Mechanical Engineering and a trade	4	4	B
4	Male	1	38	National Diploma in Mechanical Engineering and a trade	3	3	B
5	Male	1	34	B Tech Material	2	3	C

				Engineering and a trade			
6	Male	2	43	Motor and diesel mechanic and a trade	6	4	C

It is worth noting that not all the participants in this study were specifically qualified to instruct ARM. However, some lecturers reported to have had adequate information relating to the module, as they were all trained and inducted to instruct ARM. The researcher established such information during the data collection process. Furthermore, from the above lecturers' information, it shows that lecturers are not qualified in the same way. Some hold a formal academic qualification while others hold a technical qualification. Below is a figure derived from Table 4.1 that describes how the lectures are qualified:

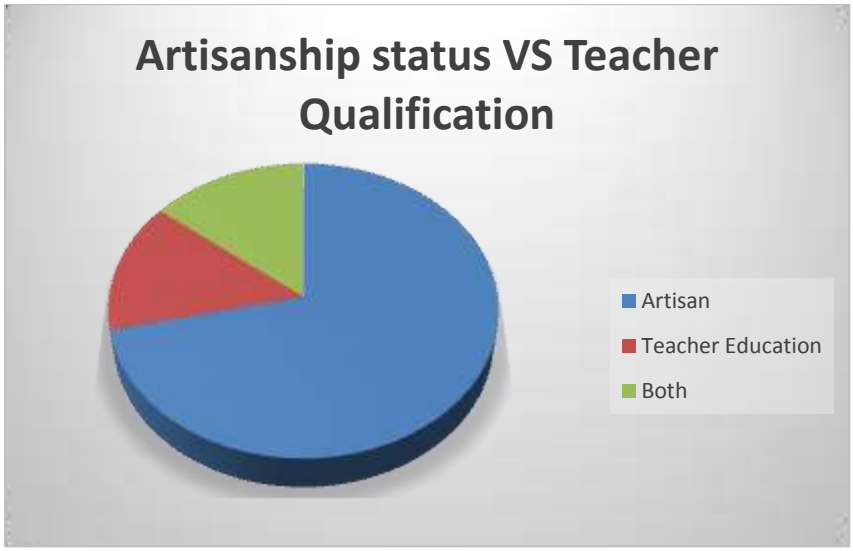

FIGURE 4.1: Comparison between lecturers who are artisans and qualified educators

Figure 4.1 above, shows that majority of the participants in this study, are qualified artisans who have vast industry experience. From the six participants, four had artisanship status whereas one was registered as an artisan but pursued his Advanced Certificate in Education (ACE). It was only one lecturer who was trained as an educator from the onset. According to

Naiker (2017, p.60) the majority of TVET lecturers in Gauteng are qualified artisans with industry experience which means that they have practical skills of workshop training but lack theoretical knowledge for classroom teaching, whereas lecturers from teaching backgrounds have theoretical knowledge for classroom teaching but lack practical experience for workshop training. The next section presents the data of the study.

4.3 DATA PRESENTATION AND DISCUSSION

The study sought to explore the current instructional practices in ARM lecturers offering NC (V) 3 and 4 with respect to the integration of ICT towards blended learning in their instruction. In this section the researcher presents data gathered using semi-structured telephonic interview with ARM lecturers. According to Marshall & Rosseman (2011) interviews form an important part of qualitative enquiry, they are personal in nature and have the ability to enable the researcher to obtain detailed information about the participants as means of exploring in depth research problems.

Semi-structured telephonic interview

The researcher chose to use semi-structured telephonic interviews as means of encouraging the "interviewees to respond open-endedly and 'to answer a question in their own terms" (Scott & Morrison, 2006, p.133). Telephonic interviews were adopted due to their two most obvious benefits; cost effectiveness and time efficiency (Cannell, 1985; Dinham, 1994; Sarantakos, 1998; Taylor, 2002 as cited in Block & Erskine, 2012, p.28). Telephones give researchers access to varied resources and experiences without the need to endure the expense and time consumed by travel to different locales. Correspondingly, telephonic interviews were adopted because the world is faced with the COVID-19 pandemic, which restricted the researcher from conducting face-to-face interviews hence the telephonic interview were a better alternative for the safety of both parties. Individual telephonic interviews were carried out to obtain in-depth understanding regarding the Technological Pedagogical and Content Knowledge issues related to instructional practices at TVET

Colleges particularly in the ARM module. This instrument addressed RQ1 and 2 which reads: *What are the TVET College lecturers' knowledge of blended learning in the instruction of Automotive Repair and Maintenance? And how does ICT aid blended learning in the instruction of Automotive Repair and Maintenance concepts?*

To make participants comfortable, the researcher started the conversation with simple general question asking about the participants' experiences like; what motivated them to be ARM lecturers, how long they have been in their current institution for, their age, the level (s) that they teach, their post-level in the College, their trades etc. As a researcher, I must applaud the participants for openly disclosing confidential information like the ages because generally, it is not easy for anyone to reveal how old they are. The researcher conducted telephonic interviews with six TVET lecturers, two from each of the three-sampled selected Colleges in GP. During the interview sessions the phone was put on speaker mode and the conversations were audio recorded to be replayed for better capturing of the conversation and to establish a pattern that would explore the experiences of the lecturers regarding their use of ICTs towards blended learning in ARM.

The interview questions that were asked, aimed at exploring the current instructional practices in ARM to understand the effective usage and challenges in relation to the integration of ICT towards blended learning. Gradually the responses that were received from the participants' differed immensely based on experience and the lecturers' habitus and beliefs about ICT integration in the process of instruction. However, some of the responses were similar as the lecturers faced the same challenges and gaps in integrating ICTs in their lessons and issues that arise within ARM itself. According to Cohen, Manion & Morrison (2007) data analysis is one of the most crucial aspects of the research process. Cohen, Manion & Morrison (2007, p.493) argue that in qualitative research, data analysis tends to be significantly rich and detailed, also qualitative data analysis "generally involves the processes of organizing, accounting and explaining the data". The researcher adopted thematic analysis approach to analyze the data. Thereafter, 6 themes emerged from analyzing the data. The themes were gathered through the process of grouping the lecturers' responses from the telephonic interviews which were conducted. The themes were generated from the patterns of similarities, based on frequency of responses and in relation to the components of the

framework presented in chapter 2 (refer to table 4.1 below). Thus, all the responses that were similar and recurring from the data collected were grouped together. The table below represents themes in relation to TPACK components.

Table 4.2: Relationship between TPACK components and themes

TPACK Components	**Themes**
TCK Technological Content Knowledge	Lack of access to resources to enable blended learning **(T 1)** Misconceptions on qualities that make a good ARM lecturer **(T 2)**
TPK Technological Pedagogical Knowledge	Lecturer's lack pedagogical practices **(T 3)** ICT integration is important in an ARM classroom **(T 5)** Lecturer's beliefs about ICTs and its integration **(T 6)**
CK Content Knowledge	Active learning effects **(T 4)**

It is important to note that within the themes, the interview responses are presented in a discursive manner rather than responding to each lecturers' response in relation to the questions posed**.** Below are the discussions of the lecturers' responses and themes that were in response to *RQ1* which reads: *What are the TVET College lecturers' knowledge of blended learning in the instruction of Automotive Repair and Maintenance?*

Theme 1: Lack of access to resources that enable blended learning

In simple interpretation, blended learning refers to the combination of face-to-face classroom instruction along with Web-based e-Learning (online learning) in order to bridge the learning gaps within a course or module. However, it became a challenge during interviews to a point where the researcher had to rephrase his question relating to blended learning, some of the lecturers do not even know what the term meant. When asked on access to resources that could enable both online and face-to-face learning, the issue of internet connectivity was a struggle in the Colleges, where some did not have access to Wi-Fi at all and the one that had it, there was a complaint that it was very limited, it's either it struggles to connect or if it does it's very slow. The lecturers alluded that Wi-Fi is limited to the admin and communal computer lab. Considering a response from lecture 1 when he was asked about challenges to the access of resources, this is what he said:

"I know the content to be taught and I can employ technology to teach, but the lack of technological resources in the lecture theatre, more especially Wi-Fi as well as the lack of up-to-date technology in the workshops is a nightmare and makes it difficult for me to teach"
Lecture 4 stated that:

"I know quite a few learning management system which I could use for online purposes, I can use technology to enhance my lessons, but for me to do that students have to be in the computer lab, as the institution does not provide any internet data to students, and I can't just assume that all of them can afford it, so I might as well stick to traditional classes".

Moreover, lecturers also cited the fact that they had not received new equipment for their workshops; they were frustrated at the fact that they were still using engines with carburetors whereas modern engines did away with that, they are now talking about pure hybrid cars. Lecturer 2 even stated that:

"It is not easy to teach my students about the electric, hybrid cars, because we do not have access to the technology that would make it possible, recent cars speak of turbos and superchargers, it's not easy as am used to showing these things in the workshop with the help of technology, I can't even let the students access such information online on the spot, I am only limited to the videos I have to bring as the Wi-Fi here is a struggle".

Through the responses given it became evident that lecturers experience various challenges with integrating ICTs to enable blended learning. On a very general note, the lack of adequate resources seemed to be a common denominator.

Rosenberg (2001) argues that blended learning, has a feature of online learning that enables lecturers to have instant updating, distribution, and sharing of information in situations where it cannot be physically done (as cited in Raihan & Han, 2013, p.62). Raihan & Han (2013) alludes that ICTs should be adopted as tools of blended learning for vocational learning and often be used to add value to the learning environment. Due to reasons that Raihan & Han (2013) maintain that the drive for blended learning lies within ICTs, it was noted that the biggest problem was having access to such resources. Lecturers mentioned almost the same challenges, in terms of having ICTs to enable online learning. Amongst other challenges, lecturers firstly mentioned access to internet/ Wi-Fi. This was a major challenge, which was mentioned. Lecturers maintain that if ICT integration is to become a reality, they need to have access to the most basic necessity which is internet. Thus, the lecturers argued to have the necessary TCK, however the issue of resources is what restricts them.

Lecturers responded that some students are from a disadvantaged background, thus blended learning in this case would be a struggle as they might lack gadgets to go online or even mobile data. Thus it should also be noted that access to the internet connectivity and lack of recent simulators, is undoubtedly a factor that would affect ICT integration especially in township Colleges and those with limited resources, because access to such is expensive. In as much as Raihan & Han (2013) argue that blended learning offer TVET students an opportunity to learn ubiquitously without being limited to the constraints of time and distance; and that through blended learning students in ARM would be experiencing the great accessibility and flexibility that ICTs offer. Furthermore, UNESCO (2011) argues that ICTs

allows for distance learning, they can also be utilized to create rich learning experiences or workplace learning. It is through the lecturers' responses it becomes evident that most factors that hinder integration of ICTs in their pedagogy towards blended learning are mostly factors that are external to them and it does not come out clear if they do have TCK or not. These are factors that are beyond the lecturers' jurisdiction. Therefore, it makes it extremely difficult for the lecturers to be able to change or mitigate these challenges on their own, they even struggle to demonstrate their efficiency in TCK**.**

Theme 2: Misconceptions on qualities that make a good ARM lecturer

When asked on qualities that make a good ARM lecturer, it could be noted that most lecturers were only concentrated on the general qualities that make an average lecturer, thus it then became clear that some lecturers do lack TCK, considering the following, lecturer 3 responded: *"For me what makes a good Automotive lecturer would be passion for the module"* furthermore lecturer 5 responded to say "*A good automotive lecturer has to like… enjoy what he or she does or else it will be difficult for them to teach the module"* moreover lecturer 4 went on to say: *"An important quality would be patience to lecture automotive, because students do find it difficult to understand it, so you need to always be composed and patience with them".*

From the responses given, it can be denoted that there is nothing special attributed to ARM (as alluded to by the lecturers) , all these qualities mentioned are just average and could not necessarily add that much value specific to ARM.

It should be noted that these lecturers lacked what Naiker (2017) calls two crucial rudiments which are essential for lecturing apart from other professions, firstly its "specific reference to knowledge and secondly is a skill base that form a special type of reasoning that ARM lecturers need to have to be able to transfer knowledge successfully" (Ts'eane, 2018, p.88). Thus, in this portion lecturers do not give specific reference to the knowledge of appropriate technologies that may be utilised, TCK.

However there were two participants, lecturer 1 and 2, responded by saying: "*An automotive lecturer needs to be a specialist, this is inclusive of specific theoretical knowledge, the kind of technology to be used in specific lessons and practical workshop sessions"*

Lecturer 2 continued to say: *"The lecturer should be able to link theory and practical, because as you teach theory you need to then show how it is done practically in the workshop, with the assistance of technology so that students can understand better what is happening practically"*.

These were the lecturers who demonstrated to be competent in TCK, thus there is lecturers who possess TCK and those who do not. This coincides with what Naiker (2017) argue that ARM lecturers need to possess what is known as professional knowledge of technologies (TCK) and know how to use them to transforms the content. Professional knowledge within the context of TVET lecturers is categorized as specialized knowledge required in enabling both lecturers and students to perform a specific type of job. Thus, lecturers need a form of knowledge that is characterised as being the process of blending sound subject knowledge with an understanding of pedagogy. Additionally, Loveless (2011) attests to Mishra & Koehler (2009) that this kind of expert knowledge (TCK) and skills is an amalgamation of various proficiency's that a lecturer needs to have, which is constructed from knowledge of students' environmental contexts, technology and knowledge of subject matter. These are sets of knowledge that are needed in order to separate average lecturers from ARM lecturers.

According to DHET (2011) a good ARM lecturer must give expression to the knowledge, skills and values worth learning in SA Colleges. Thus, the lecturer should aim to ensure that students acquire and apply knowledge and skills in ways that is meaningful to their own lives. Loveless (2011) argues that a lecturer with good TCK must always ensure that his students are equipped with the knowledge, skills and values necessary for self-fulfillment and meaningful participation in society as citizens. Furthermore, the kind of knowledge and skills lecturers impose on students should be relevant and inclined to workplace environment.

Theme 3: Lecturers lack relevant pedagogical practices

When lecturers were asked on the best pedagogical practices an ARM lecturer could have, some lecturers do not reveal what could be termed as 'best pedagogies fit for ARM' as they

basically relied on general traditional methods such as the use of textbooks and limited ICTs in less resourced workshops. The lecturers also admitted to using projectors but this was for display purposes. Amongst others pedagogies, lecturers mentioned the importance of preparing for lessons and that it is always important to gather prior knowledge from students. Considering lecturer 2 saying: *"I try as much to be prepared for my lessons, but there isn't much resources here, so I utilize what I can get. In the previous institution I used to work at, I could use simulators and all other resources that were at my disposal"*

Lecturer 1 mentioned: *"I would appreciate it if I had a wide range of resources to use, from diagnostics machines to simulators, because they would really become helpful"*.

Even though this might be the case, ARM lecturers need what (Shulman, 2005) terms as "signature pedagogies…they form habits of the mind, the hand and the heart…they prefigure the culture of professional work and provide the early socialisation into the practices and values of the field" (as cited in UNESCO-UNEVOC, 2014, p. 9). However lecturer 6 continued to say: *"I always attempt to find out what is it the students know about the topic at hand, so I'd say prior knowledge is important"* Whereas lecturer 4 said "*I like to plan my lectures beforehand, that way I am always prepared and knowledgeable about the topic I'll be presenting".*

According to Weterman & Kelly (2011) pedagogical practices are evolving as are the changing needs of the workplace and the growing gap between the technology skills between the lecturers and the students. Thus, pedagogical choices that lecturers make play an important role as they should be inclined to the kind of knowledge and skills relevant for the working environment. However, DHET (2013, p. 12) hints at the current shortcomings experienced in respect of ARM lecturers "the current staff complement is inadequate for the growing student numbers; they are inadequately trained; or are not trained in the disciplines required". Thus, the issue of lecturers training come as a huge concern, as most of the participants in this study had the status of artisanship with tons of workplace experience. For these lecturers to show full competency in TPK, necessary training should be provided to them. Consequently, it can be argued that lack of training can results in lack of appropriate TPK. Furthermore, Blom (2016, p. 3) argues that there is no training base for current TVET

College lecturers' and further, there has never been an effort to develop what she calls "a *new* pipeline of educators".

According to Blom (2016) there is a need to ensure the right balance of both industry experience and pedagogical skills in TVET lecturers, and include strengthened professional preparation for College leaders. This would be making sure that lecturers develop TPK for successful knowledge construction. The Organisation of Economic Cooperation and Development review of the South African TVET system (OECD, 2014) raise an important point that "in South Africa, although many lecturers and College leaders are of high caliber, but these lecturers lack the right mix of skills and there is little structured preparation for College leaders" (as cited in Blom, 2016, p. 5). However, in this study lecturers argued that their choices of pedagogies are limited due to the restrictions their institutions had. The major problem was resources, thus they had to use that which was available to them.

According to UNESCO-UNEVOC (2014, p. 10) TVET lecturers should have a certain kind of knowledge; the skills and competencies that TVET lecturers need to inculcate in their students include:

- Routine expertise (being skilful);
- Resourcefulness (stopping to think to deal with non-routine);
- Functional literacies (communication and the functional skills of literacy, numeracy and ICT);
- Craftmanship (vocational sensibility, aspiration to do a good job, pride in a job well done);
- Business-like attitudes (commercial or entrepreneurial – social or financial – sense);
- Wider skills (for employability and lifelong learning).

Thus, ARM lecturers need to foreground different forms of knowledge which include skills to develop best pedagogical practices.

Theme 4: Active learning improves the learning in ARM

When ARM lecturers were asked on how they engaged students in the process of knowledge construction, they argued that they involved learners actively to engage in the design and development of solutions to problems. ARM is established "affectionately as a hands- on and minds- on learning area" (Pudi, 2007, p. 165). Based on this, lecturer 3 responded:

"*I normally present my lessons in the lecture room then later demonstrate through actual visuals in the workshop even though I have limited resources*" he explained that it is was important for learners to visualize and touch the actual parts taught during lectures.

On the other hand lecturer 5 said:

"*For me I prepare slides, make sure learners are familiar with the content then we go to the workshop so they actually see what they were taught*" she further alluded that involving students and making them engage with the machines can be helpful.

Whereas the lecturer 2 responded by saying:

"*I like to do a lot of hands on with the learners, because I feel they learn easier when they see and touch the actual parts, it even becomes easier if the stuff I'd be lecturing on are available in the workshop"*

This is in agreement to what Cook-Sather (2011) argues that active learning generally focuses on the importance of students taking an active role in the process of knowledge construction; however this can only happen when the lecturer has sufficient CK. Blom (2016) alludes that technology education's main goal is problem solving thus both results and procedure are equally crucially vital in its teaching. Blom (2016, p. 7) further argues that lecturers need to give specific reference to what she terms as "problem-solving in terms of real-world situations, which requires a blend of teaching methods involving hands-on, practical, experiential and application of theory strategies". In simple interpretation, even with limited resources, lecturers attempted to engage in CK to involve students in their lessons through participation more than just listening; this was done in an attempt to develop students' skills. Wrenn & Wrenn (2009) attests to what Koehler & Mishra (2009) argue that during

presentation of CK in ARM lessons "students should be involved in higher order thinking (analysis, synthesis, evaluation) and should be engaged in activities that involve action, collaboration, discussion, and observation…Greater emphasis is placed on students' exploration of their attitudes and values" (as cited in Wrenn & Wrenn, 2009, p. 259). Thus, the lecturers appeared to be competent in CK. Based on the researcher's understanding, lecturers' CK in an active learning environment can promote students' interest in ARM and it could encourage their participation; it is therefore based on the lecturer's sufficient CK in enabling the environment for productive knowledge construction.

The four themes that were discussed above attempted to give a response to *RQ1*. Below are the two themes that discuss the lecturers' responses in responding to *RQ2* which reads: *How does ICT aid blended learning in the instruction of Automotive Repair and Maintenance concepts?*

Theme 5: ICT integration is important in an ARM classroom

When asked on ICT integration during the process of lecturing, TVET College lecturers who teach ARM proved that they have competencies in using ICTs when lecturing ARM. They acknowledge that ICT has become an important teaching tool in the 21st century.

This is how the lecturers responded: Lecturer 2 said:

ICT integration is an integral mandate and not only from the Department of Higher Education and Training, but to the changing world, therefore I believe that ICT integration is the way to go".

On the other hand, lecturer 1 said: "*With me I select videos which we watch through a projector, so it is important to know how to use a laptop or a computer along with the projector, but sometimes I tell students that they should watch the videos on their cell phones; because they enjoy using them, so I sometimes use that to my advantage, then they would have an idea what is to be done in class".*

Furthermore Lecture 6 said "*for e.g. during maintenance, I make sure that I play them several videos on how maintenance is done. Then that becomes their prior knowledge, and I would built on that, it is important to use technology"*

He explained that in his lecturing career, this approach always made his lecturing better as students would already have an idea of what to expect. On the other hand, lecturer 5 responded by saying: "*there's more to be learned, but in most cases I normally take them to the computer lab, give them a list of videos they should watch*".

It was evident from the lecturers' responses that they used their experience to facilitate knowledge construction in an attempt to employ effective instruction through the use of technology.

However, lecturer 4 said: "*There isn't much of such technologies, for a module like automotive, you need a wide range of machines and simulators to make lecturing easy".*

The lecturers agreed that teaching styles should involve an attempt to merge content and pedagogies with technology. According to the framework proposed in chapter 2, Mishra & Koehler (2006) argue that for productive and progressive learning to occur, lecturers need to blend in knowledge specialty with their best methods of teaching (pedagogy) and integrate ICTs (technology) to present their lessons, thus attributes of TPK. However, it should be noted that some lecturers indicated a limited exposure to the use of technology for teaching purposes. Lecturers understand the mandate of developing and promoting the process of knowledge construction through the integration of technology. Equally, they acknowledged that it is important to participate in a technological world as this is a way of the future, for both lecturers and students. Lecturers argued that they strived for better performance through implementation of ICTs.

Lecturers' responses coincide with what was discussed in chapter 2 of this study where Mishra & Koehler (2008) argued that teaching with technology is an overlap between subject matter, technological knowledge and pedagogical processes used by lecturers in their endeavour to promote student learning. Thus, to some extent lecturers do possess TPK. In addition to that, Thompson & Mishra (2007) embraced the idea that with TPACK; pedagogy, content and technology should not be treated separately from each other but should be considered as a whole for good teaching. Based on the lecturers' responses, there is an

attempt to employ technology in lecturing, as Naiker (2017, p.11) attests to Mishra & Koehler (2009) that lecturers technical skills should include effective use of innovative instructional strategies such as the use of simulators, electronic training boards in order to teach certain topics.

Theme 6: Lecturers beliefs in ICTs and their integration

When lecturers were asked on their beliefs in terms of ICTs and its integration, with relation to the benefits that ICTs could offer, TVET College lecturers who lecture ARM argued that integrating ICTs into their process of instruction was a necessary practice, they sounded optimistic about technology. Lecturers also had some knowledge about some of the affordances that ICTs could potentially bring into ARM. For instance, Lecturer 3 gave a very thought-provoking response that alluded to the fact that ARM is a technology which requires a technology to be used. She said the following:

"There is no way you can teach Automotive without technology by just talking, technology makes teaching easier and more practical".

Moreover, Lecturer 5 went to say:

"It is very necessary to use technology when teaching Automotive. Without technology there is no Automotive and technology is helpful when teaching. Technology makes everything easier, to both the lecturer and student".

Lecturer 6 said: *"For me I see technology offering lots of disadvantages and above all it makes it easier for the student to grasp the knowledge and understand of the content better".*

This is in agreement to what TPK emphasizes, Mishra & Koehler (2008) maintain, that technology usage in the process of lecturing offers lots of advantages and that lecturers need to emphasize the importance of introducing and infusing technology into their pedagogical practices. The lecturers argued that if an ARM lecturer focuses too much on giving the students content without using technology to assist students; the students might not be able to understand and apply the content which they were taught, and this would be a huge problem because in ARM students are not only expected to understand theoretical concepts, but they

are also expected to be able to apply the knowledge and skills. This is in agreement to what Mishra & Koehler (2009) argue, that TPK can help to enhance and make the learning and teaching process more efficient, also it is important to note that technologies have their own inclinations, potentials, affordances, characteristics and limitations that make them more suitable for certain tasks and subjects than others. Furthermore, TPK argues that teaching with technology is an overlap between technological knowledge, and pedagogical processes used by lecturers in their endeavor to promote student learning. Thus, lecturers' beliefs about ICT integration play a huge role in terms of how they view it. It became evident that the lecturers do appreciate ICTs, and they would intergrate them if they were available.

4.4 CONCLUSION

This chapter presented the qualitative data presentation and analysis. The results from the qualitative research were presented descriptively with cross-reference quotes in order to make the presentation lively. It was noted that most of the lecturers in this study held the status of artisanship, thus come with lots of experience from industries and/ firms but with limited pedagogical strategies. It thus has to be noted that blended learning could not be achieved based on the limitation of resources in the Colleges. To some extent, lecturers claim to be competent in TCK, however, they do not have sufficient opportunities to use ICTs at Colleges, some are not really competent in TCK. However, Mishra & Koehler (2009) argue that having technology knowledge and skills alone does not necessarily guarantee effective adoption of technology into teaching practice. It became evident that ARM lecturers' understanding of specific characteristics or behaviors related to the technology components impacts on successful planning and implementation of ARM, the lecturers were competent on CK and to some extent on TPK. The next chapter presents a summary, limitations and recommendations of the study.

CHAPTER 5: SUMMARY OF FINDINGS, CONCLUSION, LIMITATIONS AND RECOMMENDATIONS FOR THE STUDY

5.1 INTRODUCTION

This final chapter provides a summary of the key findings arising from the main research question and two sub research questions in chapter 1. It then presents limitations of the study, the chapter then concludes with recommendations for further research in the instruction of ARM.

5.2 LIMITATIONS

Simon (2011, p. 2) explains limitations as potential weaknesses in the study that are out of control of the researcher, this can include the population sample and responses from participants. The sample population of this study was restricted to six TVET College lecturers within Gauteng Province that offer ARM, NC (V) level 3 and 4. The Colleges and number of lecturers were selected due to financial considerations and time constraints. The study adopted a semi-structured telephonic interviews (open ended) aiming to probe the lecturers' insight in their challenges and successful traits in the instruction of ARM. Interviews were appropriate and leaned towards the kind of data the study was aiming to collect. Other methods such as observations could have been used, which could have provided rich data, however there is a huge influential crisis we are facing as the whole world, the outbreak of COVID-19. The virus came as a huge and influential limitation.

Due to this, the researcher chose to stick to telephonic interviews because the selected Colleges could not allow their lecturers to be in physical contact with researchers; even the lecturers themselves had concerns, due to safety reasons. Furthermore, one of the Colleges had paused their contact lessons due to a lecturer testing positive for the virus, in that situation there was not much to observe. Accordingly, since it was foreseen that the researcher could not control the responses which the participants would give, the researcher motivated the lecturers by stressing the importance of the study for the improvement of

TVET instructional methods and asked that they should not limit themselves in terms of answering the interview questions posed, they were encouraged that they should be descriptive and in depth as possible.

5.3 CONCLUSION

The aims of this study was to explore the current instructional practices in ARM lecturers offering NC (V) level 3 and 4 with respect to the integration of ICT towards blended learning in their instructions in Gauteng.

The first RQ that was asked was: *What are the TVET College lecturers' knowledge of blended learning in the instruction of Automotive Repair and Maintenance?*

It was found that some lecturers do have sufficient knowledge of using ICTs which they can implement towards blended learning and they are able to use them for successful knowledge construction; however they are disadvantaged due to lack of resources. In contrast, some lecturers, especially those without a teacher qualification, demonstrate limited instructional pedagogies. It became evident as they only resorted to the most common methods of lecturing. Thus, lecturers are not successful in implementing blended learning in ARM due to limited resources.

And *RQ2* which reads*: How does ICT aid blended learning in the instruction of Automotive Repair and Maintenance concepts?*

For this research question, it was found that lecturers attempt to integrate ICTs in lecturing ARM; from cellphone to computers, projectors and old models of simulators in their workshops. They integrate ICTs in their lessons through using projectors for display purposes and for students to watch selected videos for the lesson at hand. To some extent, the

lecturers go as far as taking the students to the computer lab, where students can watch videos for the lesson. They argued that there is no way ARM can be taught without technology.

The study attempted to research the gaps between lecturers' beliefs and their pedagogical practices. ARM lecturers would then be preparing their students for an increasingly technologically based world of work, thus meeting the skills shortages and contributing to the economy of the country. Thus, lecturers' strategies are not focusing on changing their pedagogical methods, specifically shifting from the traditional way of teaching to active and engaged learning, where students can learn constructively using methods such as research and experiments. Ultimately, Blended learning in ARM is an issue, as TVET College lecturers lack necessary resources in order to implement it.

5.4 RECOMMENDATIONS FROM THE STUDY

The key findings arising from the study are that TVET lecturers attempted to use technology to support and enhance their teaching practices and students' learning, however the issue of resources come as a big challenge. Lecturers' usage of technology was constrained by inadequate resources, such as diagnostics machines and automotive simulators, and also lecturers need an exposure to alternative pedagogical theories and practice rather than those traditional methods of instruction. Thus, the study recommends the following:

- ARM lecturers need resources such as technical simulators to make the process of instruction easier. Furthermore, to improve ICT integration towards blended learning, pedagogical practices that encourage effective teaching and addressing challenges faced by lecturers during integration; the DHET or TVET Colleges themselves, need to provide professional development activities related to technology to update lecturers' skills and knowledge, and offer technical support when needed.

- The government should organize continuous and periodic training and retraining of lecturers through capacity building workshops, seminars and conferences to boost their ICT literacy level to enable them utilize ICT resources while teaching their students.

- Most importantly, there is an urgent need for DHET to provide ICT facilities, this includes up to date workshops with recent resources. Consequently, future studies ought to observe how ARM lecturers teach in their endeavour to produce skilled artisans, as the current study is limited in a sense that it was confined strictly to telephonic interviews because of COVID 19 regulations.

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APPENDIX A: INTERVIEW SCHEDULE

- How long have you been a lecturer? How old are you? Are you registered as an artisan?
- What is your highest qualification? Tell me more about your educational background
- What kind of technological resources are freely accessible to you to assist enabling blended learning?
- Do you know how to select effective instructional opportunities to guide and engage student thinking and learning in ARM? give an example
- How do you deal with any misconception and errors students make either during lectures or in the workshop first hand?
- Given the years you have spent as a lecturer, what qualities do you think makes a good ARM lecturer?
- What are your beliefs in terms of ICTs and its integration?
- How do you integrate ICT's during the process of lecturing?
- What do you know about technologies that can help you to present your content to enhance teaching and learning?
- What type of technologies do you use to enhance your teaching of ARM?
- How is your level of ICT integration competency affect your motivation to use Technology in lecturing?
- How do you ensure that your instructional practices are geared towards job placement?
- What are the best pedagogical practices an ARM lecturer could have?

APPENDIX IB

LETTER TO THE EXECUTIVEICOMMITTEE DATE:_____

Dear Sir/Ma'am

My name is Koketso Morudu I am a Post-Grad student (Masters) in the School of Education at the University of the Witwatersrand.

Iiamidoingiresearchioni: **Exploring the use of ICT in a TVET College course: Towards blended learning in Automotive Repair and Maintenance**

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Yours sincerely;

KoketsoiMorudu

Address:i17iClarendoniPlace

Parktown

2001

EMAIL:i729521@students.wits.ac.za/iwww.morudukoketso@gmaili.com

Cell:i079i668i8696

SIGNATURE:_____

APPENDIX C

LECTURERS' CONSENT FORM

Please fill in and return the reply slip below indicating your willingness to be a participant in my voluntary research project on: **Exploring the use of ICT in a TVET College course: Towards blended learning in Automotive Repair and Maintenance**

I give my consent for the following: **Circle one**

Permission to be audiotaped

I agree to be audiotaped during the interview YES / NO i

I know that the audiotapes will be used for this project only YES / NO

Permission to be interviewed

I would like to be interviewed for this study YES / NO i

I know that I can stop the interview at any time and that I don't have to i

answer all the questions asked. i i YES/NO

Informed Consent

I understand that:

- my name and information will be kept confidential and safe and that my name and the name of my institution will not be revealed nor used in any publications, instead a name such as 'Lecture 1 or 2' will be used.
- I do not have to answer every question and can withdraw from the study at any time.
- I can ask not to be audiotaped, photographed and/or videotape
- all the data collected during this study will be destroyed within i3-5 years after completion of the project.

Sign_____ Date_____

APPENDIX D

PERMISSION LETTER TO THE LECTURER
Date…….

Dear Sir/Madam,

Re: Permission to interview you for a research study.

My name is Koketso Morudu, I am a Masters student in the School of Education at the University of the Witwatersrand. I am seeking permission to do telephonic interviews with you for the purpose of my study.

I am conducting research on: **Exploring the use of ICT in a TVET College Course: Towards blended learning in Automotive Repair and Maintenance.** This topic was chosen in order explore the instructional practices in automotive repair and maintenance lecturers (offering NCV 3 and 4) with respect to the integration of ICT in their classroom instructions in order to attempt to offer possible recommendations, which could be used to assist other lecturers with the integration process of ICT in institutions of higher learning, more especially in TVET Colleges in order to accomplish blended learning practices in TVET.

I invite you as a lecturer to participate in this study, as you have vast experience in the field and because data collected from you will be relevant in terms of what the study seeks to accomplish. If you agree, you will be asked to be interviewed telephonically in order to abide by COVID 19 regulations and save you meeting time. The average time needed for us to complete the interview is 15-20 minutes, the interview can take place at your most suitable time, either in the morning before your class, during break or even in your spare time when you are free. The phone I will be calling with will be on speaker mode, thus recording our interview.

You will be asked to give your written consent before the research begins, your responses will be treated confidentially, and identities (your names and the name of the organisation) will be anonymous. Individual privacy will be maintained in all published and written data resulting from the study.

The results will be communicated to you via email if you have interest and this study is for masters degree purposes.

You will not be advantaged or disadvantaged in any way. You are reassured that you can withdraw your permission at any time during this project without any penalty. There are no foreseeable risks in participating in this study, additionally you will not be paid for this study.

All research data will be destroyed after 3-5 years.

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

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

Yours sincerely,

Name: Koketso Morudu

Address: 17 Clarendon Place

Parktown

2001

EMAIL: 729521@students.wits.ac.za/ www.morudukoketso@gmail.com

Cell: 079 668 8696

SIGNATURE:_____

APPENDIX E

INFORMATION SHEET FOR LECTURERS
DATE_____

Dear Sir/Ma'am

My name is Koketso Morudu, I am a Masters student in the School of Education at the

University of the Witwatersrand.

I am doing research on: **Exploring the use of ICT in a TVET College Course: Towards blended learning in Automotive Repair and Maintenance**. I would like to invite you to participate in my research study.

My research involves interviewing lecturers who work at TVET Colleges around Gauteng, in order to gain insight on how you as the lecturer undertake your lessons and how you clear or avoid misconceptions of students. I would like to conduct telephonic interviews with you either in the morning before your classes starts, during break time or after hours, even during your spare time depending on your availability.

The reason I have chosen you is because you are lecturing Automotive Repair and Maintenance and that plays a vital role in producing skilled artisans. I am inviting you to participate in this research because data collected from you would be relevant for my research ; based on your experience in the field.

You will not be advantaged or disadvantaged in any way, you are therefore reassured that you can withdraw your permission at any time during this project without any penalty. There are no foreseeable risks in participating in this study. You will not be paid for this study.

Your name and identity along with that of your institution will be kept confidential at all times and in all academic writing about the study. Your individual privacy will be maintained in all published and written data resulting from the study.

All research data will be destroyed between 3-5 years after completion of the project.

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

Yours sincerely;

Name: Koketso Morudu

Address: 17 Clarendon Place

Parktown

2001

EMAIL: 729521@students.wits.ac.za/ www.morudukoketso@gmail .com

Cell: 079 668 8696

SIGNATURE:_____

APPENDIX F: ETHICS CLEARANCE LETTER

WITS SCHOOL OF EDUCATION

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG

SCHOOL OF EDUCATION ETHICS COMMITTEE

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

CLEARANCE CERTIFICATE	**PROTOCOL NUMBER: 2020ECE172M**
PROJECT TITLE	Exploring the use of ICT in a TVET College course: Towards blended learning in Automotive Repair and Maintenance
INVESTIGATOR	**KOKETSO MORUDU**
SCHOOL/DEPARTMENT OF INVESTIGATOR	WITS SCHOOL OF EDUCATION
DATE CONSIDERED	12 March 2021
DECISION OF THE COMMITTEE	Approved unconditionally
EXPIRY DATE	Date of submission of the project report

ISSUE DATE OF CERTIFICATE 30 March 2021 **CHAIRPERSON** _____ (Dr Paul Goldschagg)

cc: Supervisor: Dr Vasidevan Naiker

DECLARATION OF INVESTIGATOR

To be completed in duplicate and **ONE COPY** emailed to the Ethics Office: Matsie.Mabeta@wits.ac.za .

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

_____

Signature **Date**

PLEASE QUOTE THE PROTOCOL NUMBER ON ALL ENQUIRIES

APPENDIX G: PERMISSION TO CONDUCT RESEARCH



higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

Central Johannesburg TVET College

Date: 01/28/2021

To: Whom it may concern

Dear: Sir/Madam

This serves as prove that Mr Koketso Morudu has been granted permission to carry out research titled: **Exploring the use of ICT in a TVET College course: Towards blended learning in Automotive Repair and Maintenance.**

The researcher has to seek permission from the participants and shall be performed only with the participants (lecturers in this case) permission.

I hope you will find this in order

Shaun Roy Merton

Central Johannesburg college

DEPUTY PRINCIPAL: ACADEMIC AFFAIRS.

APPENDIX H: PERMISSION TO CONDUCT RESEARCH

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

SOUTH WEST GAUTENG COLLEGE
EDUCATION OF DISTINCTION

TO WHOM IT MAY CONCERN

On behalf of the committee, I hereby confirm that **MR KOKETSO MORUDU** has been granted permission to undertake a research titled "**Exploring the use of ICT in a TVET College course: Towards blended learning in Automotive Repair and Maintenance"** with Engineering and Related Design lecturers in our Roodepoort campus.

Marais C

Deputy Campus Manager

APPENDIX I: PERMISSION TO CONDUCT RESEARCH





222 Marshall Street, Cortex Building

Tel: 011 334 2751

Fax: 011 334 2761

E-mail: campusmanagerjhb@jeppecollege.co.za

Research: K.Morudu

Dear: Mr K Morudu

Following serious consideration and perusal of your proposal, we hereby inform you that permission to undertake your research with our lecturers has been granted.

N.B. This letter is only valid for the year 2021

Yours in Education and Training

Abdul Tenywa

Chairman Joint Academic Committee

Jeppe College