TECHNICAL AND VOCATIONAL EDUCATION AND TRAINING LECTURER LEARNING THROUGH WORK-INTEGRATED LEARNING: A STUDY OF THREE COLLEGES IN KWAZULU-NATAL

BY

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DEDICATION

I dedicate this study to my late mother, Violet Rute Mesuwini Banda, whose words of wisdom I knotted in my heart and continue to use. I thank my father, Josephat Mesuwini Banda (Big Engine), for all the prayers.

DECLARATION

Unless explicitly indicated to the contrary in the text, this thesis entitled "Technical and vocational education and training lecturer learning through work-integrated learning: A study of three colleges in KwaZulu-Natal" is mine. It has not been presented for the award of a degree at this or any other university. Where I used the work of others, it is appropriately acknowledged in the text.

The Durban University of Technology granted ethical clearance for this study. The Department of Higher Education and Training and Technical and Vocational Education and Training colleges granted gatekeeper letters as permission to conduct research at their institutions.

The submission of the Doctor of Education Degree is by Monograph Thesis. Considering the number of publications that emerged from this work, I list them. The research papers listed herein are my original work stemming from investigating TVET lecturer learning during WIL to determine what and how they learn and if they understood their learning. The following articles were published in peer-reviewed journals accredited by DHET:

1) Work-Integrated Learning experiences of South African Technical and Vocational Education and Training lecturers. Under review at the *International Journal of Work-Integrated Learning*. Submitted on 12 July 2021. Reference code: IJWIL M948. The publication process is in progress.
2) Nature of TVET Lecturer Learning during Work Integrated Learning: A South African Perspective. Submitted for review to the *Journal of Technical Education and Training* on 12 July 2021. Manuscript reference: 9301-37984-1-2-20210712. Accepted 03 November 2021.
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3) Exploring TVET lecturer conceptions about their learning during work-integrated learning in South Africa. Submitted to the *Higher Education, Skills and Work-based Learning* journal for review. Manuscript ID is HESWBL 08-2021-0151. The publication process is in progress.
4) Employer perceptions of TVET lecturer learning through WIL. *South African Journal of Human Resource Management.* Work in progress.

5) Reflections on my PhD journey as a TVET College lecturer. *Journal of Contemporary Management.* Work in progress.
6) Examining TVET Lecturer Work-Integrated Learning in Industry: Knowledge Gained through Practice from a South African Perspective. Work in progress.
7) Induction and mentoring: A TVET lecturer work-integrated learning experience. Work in progress.

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"God is our shelter and strength, always ready to help in times of trouble". Psalms 46:1

ABSTRACT

This study explored TVET lecturers learning through work-integrated learning (WIL), specifically to establish the nature of their learning and the kinds of knowledge they gain, and further determined how the lecturers understand their learning. WIL describes an approach to career-focused learning, which is often appropriate for attaining discipline-specific practical competence. My study contributes to the literature on how WIL enhances TVET practical knowledge and pedagogy. It also contributes to the perceptions of industry personnel towards lecturers on WIL.

The study used a qualitative research approach located in an interpretive paradigm. A face-to-face semi-structured interview was conducted with 18 TVET college lecturers from three different colleges and nine industry personnel at different companies. Non-participant observation complemented interviews and enabled capturing social action and interaction as it occurred and provided triangulation. The data were analysed using open coding. The study draws on Kolb's Experiential Learning Theory (ELT), complemented by conceptual frameworks on domains of teacher knowledge.

The research identified the following challenges: a lack of technical skills among lecturers in using civil, electrical and mechanical engineering machines and equipment in industry; industry induction processes promoted WIL and self-initiated learning in the TVET sector that was helped a limited number of lecturers; and a lack of lecturer WIL support. There were several findings that reflect on positive impact of the training programme, namely, TVET lecturers who participated in the training gained knowledge about industrial processes; improved knowledge and practice of safe working procedures; the lack of interpersonal skills in the TVET industry was addressed; there was creativity and cost-saving skills among civil engineering TVET lecturers; WIL offered problem-solving skills to TVET lecturers; evidence of the use of work schedules; and training helped in the formation of industry connections.

The study recommends adequately capacitating TVET lecturers with technical and soft skills to ensure that they comprehend the use of advanced machinery. The lecturers on WIL need constant support to check the relevance of practical skills received during WIL. To ensure proper training, the study recommends a training model for TVET lecturers during WIL. The

study further recommends TVET lecturers to engage in industry placement at regular intervals to maintain current developments in the industry. This study recommends that policymakers, industry and other TVET college stakeholders employ prudent participative and consultative strategies to ensure that TVET lecturers acquire the requisite skills needed as recommended by syllabi. Furthermore, this study recommends a large scale research on all TVET College lecturers in South Africa to understand what and how they learn during WIL; involving other disciplines besides civil, electrical and mechanical trades to check if the outcome will be similar; and explore how industry personnel profiles impact on TVET lecturers learning in the industry during WIL using the same instruments.

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ABBREVIATIONS

ANOVA	: Analysis of Variance
4IR	: Fourth Industrial Revolution
ASEAN	: Association of Southeast Asian Nations
CBT	: Competency-Based Training
CHE	: Council of Higher Education
CHIETA	: Chemical Industries Education and Training Authority
CK	: Content Knowledge
CNC	: Computer Numerical Control
DBE	: Department of Basic Education
DHET	: Department of Higher Education and Training
ELT	: Experiential Learning Theory
ETDP	: Education Training and Development Practices
FET	: Further Education and Training
FETI	: Further Education and Training Institute
ILO	: International Labour Organization
IREC	: Institutional Research Ethics Committee
KZN	: Kwazulu-Natal
MIG	: Metal Inert Gas
NATED	: National Technical Education
NCV	: National Certificate (Vocational)
NDP	: National Development Plan
NOSS	: National Occupational Standard Skills
NQF	: National Qualifications Framework
NSFAS	: National Students Financial Aid Scheme
NVIVO	: Qualitative Data Analysis Software
PCK	: Pedagogical Content Knowledge
PGCE	: Post Graduate Certificate in Education
PLC	: Programmable Logic Control
PPE	: Personal Protective Equipment
QCTO	: Quality Council for Trades and Occupations
RPL	: Recognition of Prior Learning
SACE	: South African Council for Educators
SETA	: Sector Education and Training Authority

SMME	: Small, Medium and Micro Enterprises
SPSS	: Statistical Product and Service Solutions
SSACI	: Swiss-South African Cooperation Initiative
TAFE	: Technical and Further Education
TIG	: Tungsten Inert Gas
TPCK	: Technological Pedagogical Content Knowledge
TVET	: Technical and Vocational Education and Training
UNESCO	: United Nations Educational, Scientific and Cultural Organisation
UNEVOC	: International Centre for Technical and Vocational Education and Training
VET	: Vocational Education and Training
TEVETA	: Technical Education, Vocational and Entrepreneurship Training Authority
WBE	: Work-Based Education
WIE	: Work-Integrated Education
WIL	: Work Integrated Learning

CHAPTER 1: INTRODUCTION AND OVERVIEW

1.1 INTRODUCTION

The dynamic changes in technology and knowledge demand that Technical and Vocational Education and Training (TVET) lecturers engage in an ongoing learning process (Van der Bijl and Oosthuizen 2019). Work Integrated Learning (WIL) is an initiative aimed at equipping TVET lecturers with practical industry experience. Lecturers can expand their experience and keep abreast with cutting-edge developments in technology (Mabhanda 2017). This study aims to explore TVET lecturers' learning through WIL, specifically to establish the nature of their learning, the kinds of knowledge they gain, and how they understand their learning.

TVET lecturers ideally should be multi-faceted professionals with two-in-one qualifications (trade and professional teaching qualifications) (Swiss-South African Cooperation Initiative 2016a; Schmidt 2019). Bantwini and McBride (2011) conducted a study in the Eastern Cape, South Africa, and reported that lecturers were predominantly academically qualified and recommended research to explicate the extent to which lecturers would gain workplace experience through WIL. Practical knowledge is possible when TVET lecturers get a chance to gain industrial experience through WIL. Countries similar to South Africa (Egypt, Botswana, Zambia, Kenya) have adopted a top-up system of TVET lecturer qualifications and development, whereby the upgrading of qualifications after a job offer becomes part and parcel of their staffing model (Bantwini and McBride 2011). Department of Higher Education and Training (2013a) acknowledges that a combination of theoretical and practical training is a defining characteristic of any vocational education curriculum. Therefore, any vocational system needs lecturers to be qualified in both forms of instruction. Blom (2016b) concurs that the TVET lecturer has a dual identity: a professional educator and a business or industry professional. Mokone (2011) supports that some TVET lecturers have theoretical knowledge for classroom teaching but lack practical workshop training experience. For this reason, some modernised workshops are underutilised because some of the TVET lecturers cannot operate new machines (Mokone 2011). Therefore, WIL could equip such lecturers with the trade qualification, adding to what the lecturer possesses from initial university or college training.

The policy on professional qualifications for TVET lecturers in South Africa (2013) states that TVET lecturers need to be proficient and knowledgeable in practical and theory following industry demands (Department of Higher Education and Training 2013b). The policy on Post-School Education and Training, among others, emphasises the integration of the TVET system with industry through college-industry partnerships to locate opportunities for WIL (Department of Higher Education and Training 2013c). Therefore, the workplace experience for TVET lecturers must be prioritised so that their training is updated to match the industry's latest technology developments and the TVET curriculum (White Paper on Building an Expanded, Effective and Integrated Post-School System 2013; The National Skills Development Strategy III for 2011 – 2016).

The Higher Education Act (101/1997) foregrounds the need for TVET lecturers to possess appropriate knowledge and skills for handling different National Qualifications Framework (NQF) levels and subjects within their areas of specialisation. The National Skills Accord enunciated in 2013 vowed to provide work experience opportunities for a minimum of 16 000 lecturers in the TVET college sector. The Policy on Professional Qualifications for TVET Lecturers (2013) pronounces that professionally qualified lecturers must be well-informed about students' demands in the industry such that they can teach them to meet the workplace demands (Department of Higher Education and Training 2013b). The TVET Lecturer's practical experience of their trade in the workplace could be linked to the quality of their instruction and the ability to adequately prepare their TVET students to enter the world of work. The provision of quality and relevant skills to students depends on the strength of the lecturers' qualifications. UNESCO emphasises that lecturers have the strongest influence on the quality of learning which depends on their initial teacher education and ongoing professional development support (United Nations Educational Scientific Organization 2016).

Department of Higher Education and Training (2015a) and Education, Training and Development Practices Sector Education and Training Authority (ETDP SETA, 2019) report that ineffective TVET lecturers with limited subject knowledge were identified as unqualified and under-qualified lecturers in the TVET system. In support, Baffour-Awuah and Thompson (2012) say that the quality of TVET lecturers influences the delivery of TVET college programmes. These lecturers are not well qualified to teach in the TVET sector because they do not have practical competencies and experience. Research conducted by Wedekind and

Watson (2016) in South Africa established that most lecturers possess education qualifications suitable for school teaching rather than for TVET college learning. However, another problem, as Moore (2013) laments, is that there is a "problem of fit" in which the forms of knowledge acquired from institutions in which lecturers are trained do not align clearly with the knowledge required for optimal functioning in the teaching and learning at TVET colleges and consequently for the industry. TVET lecturers apparently lack practical skills and knowledge required for the didactics in the subjects they teach. Therefore, practical exposure and time spent in controlled learning experiences in industry settings are crucial components in the making and professionalization of the TVET lecturer. The following section discusses the focus and purpose of the study.

1.2 PROBLEM STATEMENT

The mission of TVET colleges is to develop human resources for the industry sector (United Nations Educational Scientific Organization 2016). It has been implied in the introduction that TVET lecturers lack industry skills that are needed in their line of duty. The DHET has a concern about the qualifications of TVET lecturers and the need for industry exposure (Department of Higher Education and Training 2013d). They have to be subject specialists with current knowledge and industry experience of their subject content. TVET college lecturers (Van der Bijl and Taylor 2018; Zulkifli *et al.* 2018) have to bridge the gap between theory and practice in teaching their subjects. Van der Bijl and Taylor (2018) appeal that TVET lecturers require WIL engagement in suitable industry environments to develop appropriate industry practical expertise to effectively teach their subjects and prepare their students for the workplace demands. In response to this challenge, Swiss-South African Cooperation Initiative (SSACI) and ETDP SETA embarked on the TVET lecturer WIL initiative to develop practical skills. However, the learning of these TVET lecturers through WIL is not known, which makes it urgent to investigate TVET lecturer learning through WIL. This study seeks to explore TVET lecturers' learning, understand what and how they learn and how they understand their learning through WIL. Figure 1 below shows what the TVET lecturer needs to through to produce industry-ready graduates.

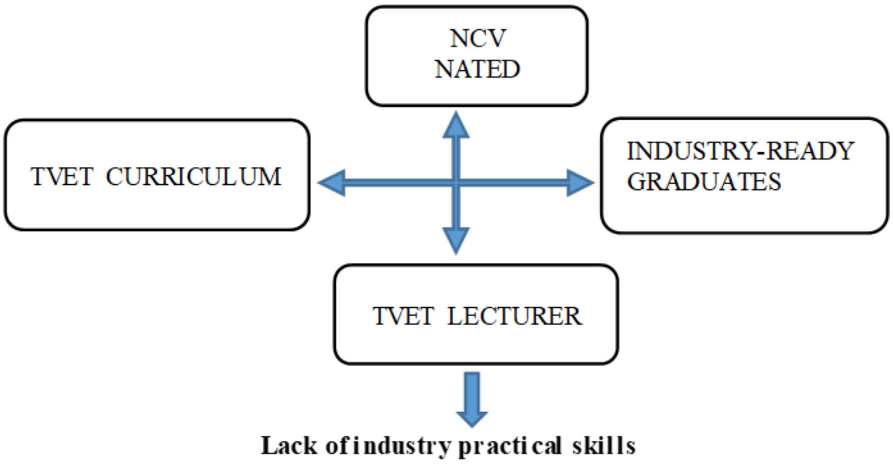

Figure 1: **Problem statement**

Source: Designed by the author

Notes: Figure 1 explains the link between the lecturer, TVET curriculum and graduates. The lecturer lacks the requisite skills as informed by the curriculum to produce industry-ready graduates.

1.3 PURPOSE OF THE STUDY

TVET lecturer WIL in South Africa is a relatively new initiative spearheaded by the SSACI. The information on how and what lecturers learn in the industry remains mostly unknown. The TVET lecturers who do not have industrial exposure can gain hands-on industry experience for two years. The TVET lecturers should gain adequate industry skills upon completion of the attachment period.

This study aims to explore TVET lecturers' learning during WIL, establishing the kinds of knowledge they gain, the nature of their learning (how they learn), and determining how they understand their learning. In that respect, a model for TVET lecturer WIL implementation is proposed to ensure effective industry practical training. TVET is defined as the study of technologies and related sciences, practical skills acquisition and knowledge related to careers in various sectors of economic and social life (United Nations Educational Scientific and Cultural Organisation 2013). Tikly (2013) emphasises that TVET has a primarily influential function of providing the much-needed workforce required by industry to prepare students for sustainable livelihoods. It is an important link between training and the practical realities of the world of work.

From the Department of Higher Education and Training (2014a) perspective, TVET is the cornerstone of national skills development, with a mandate to provide the public with intermediate to high-level skills to create a strong base for higher education. TVET colleges can facilitate the change from school to work and develop self-reliant life-long learners. However, the current situation in TVET may not promote the achievement of the objectives set out above as lecturers lack the requisite knowledge, skills and experiences. Swiss-South African Cooperation Initiative (2012) notes that most lecturers in the TVET sector are either unqualified or under-qualified. Due to the shortage of skilled workforce in the sector, many are employed without industrial exposure and experience. However, they are expected to prepare students for the industry. Industrial exposure is on-the-job training where the lecturer gains practical skills while working in an industry environment, using the equipment and machinery, and doing the job (Leong and Kavanagh 2013). During this period, the lecturer develops competencies in their areas of specialisation (mechanical, electrical and civil), and they usually work under the supervision and guidance of experienced industry personnel. Similar observations are made by Blom (2016b), who also indicates that the TVET sector is forced to appoint lecturers from its graduates who would not have obtained industrial exposure and experience due to workforce shortage. The DHET Minister, Dr Blade Nzimande, lamented that the lack of industry experience among lecturers in TVET colleges is worrying because National Technical Education (NATED) Diploma (N6) graduates are teaching students at this level, without industry exposure and experience (Mabena 2017). The lack of industry experience has raised the need to investigate WIL to understand what TVET lecturers learn in industry and how they learn.

Given the high enrolments in TVET colleges and the government's goal to further expand enrolments to more than two million (Blom 2016a), the South African government partnered with SSACI and Education Training and Development Programme Sector Education and Training Authority (ETDP SETA) in 2012 to offer industrial exposure to TVET lecturers in 28 colleges (SSACI 2016b). The present WIL programme launched in 2014 was after the initial 2012 and 2013 one-week lecturer industry Work-Based Exposure (WBE) observations. This current WIL programme requires lecturers to gain industrial exposure for two consecutive years and in the interim, acquire the requisite practical experience (Swiss-South African Cooperation Initiative 2016a). However, since the launch of the WIL initiative, what lecturers learn, and how they understand their learning have not been researched. My study seeks to investigate the nature of learning of these lecturers, the kinds of knowledge they gain and how they understand their learning through WIL. Findings and recommendations from the study inform the discussions and policy decisions in the DHET, SSACI and SETAs on this initiative and may influence the provision of other forms of support required for the TVET sector. The rationale is discussed next.

1.4 RATIONALE

South African Council for Educators (2011) indicated in the Free State Province that lecturers at TVET colleges need to be developed to live up to the expectations as they were found to have no lecturer training or had teacher training aimed at schoolteachers. However, there is no practice in South Africa of training TVET lecturers specifically for their context. WIL could assist TVET lecturers in reflecting critically and becoming knowledgeable about their students' demands since the same industrial experience they gain during their WIL attachment forms an appropriate base when they qualify to go to industry. While WIL was intended to offer industry-learning opportunities to TVET lecturers, it is yet to be established whether it is essentially appropriate to their lecturing context.

Blom (2016b) puts forward that the currency of workplace knowledge and experience is often non-existent or dated, with no supporting mechanism to ensure that lecturers update their practical experience. The suggestion is that the current TVET lecturers could be using their initiatives, making deductions from their theoretical understanding of the curriculum. Previous studies (Govender and Taylor 2015; Govender and Wait 2017; Sephokgole and Makgato 2019) focused more on South African school teachers and students' WIL. Wedekind and Watson (2016) put forward that TVET research in South Africa has generally been produced by a relatively small group of researchers and is comparatively underdeveloped. Furthermore, there is a dire need for research in the TVET sector since there is a paucity in the public domain on industry trainers (McGrath and Powell 2016; Jahonga 2020; McGrath *et al.* 2020). Therefore, this research adds to the existing literature on WIL for TVET lecturers and could have a dramatic influence on policy on TVET lecturer training, recruitment, and the minimum qualification standards expected of lecturers. The study further charts new horizons on the potential of WIL by offering an accurate account of reality from the findings.

Swiss-South African Cooperation Initiative (2016a) speculates that TVET lecturers are motivated, confident and competent with current industry knowledge and experience, creating a closer alignment between the college curriculum and industry requirements. The speculation drives the need to explore TVET lecturers' learning through WIL.

WIL is relatively new in South Africa, and there has not been much research on the areas indicated by Wedekind above. Advocates for WIL such as Mutereko and Wedekind (2017); Papier (2017); and Blom (2015) acknowledge the limited research and the need for more engaged studies in this niche. These proponents, except Blom, have studied the current situation and level of TVET lecturer qualifications and their improvement. My study narrows the gap between what and how TVET lecturers learn through WIL, as research is scarce in this area. There is a dearth of formal research literature on South African TVET Colleges and barely little of trite research on the lecturers in TVET colleges (Blom 2016b). The background to this study is discussed in the next paragraphs.

1.5 BACKGROUND TO THE STUDY

In South Africa, the TVET system has undergone significant transformation from 1994 to date (Mutereko and Wedekind 2017; McGrath *et al.* 2020), including a change of name from Further Education and Training (FET). The new name (TVET) generally offers a better reflection and definition of the nature and role of the TVET college system. From an African perspective, TVET is defined as studying technologies and related sciences, acquiring real-world practical skills, attitudes, knowledge and understanding that Africa needs to come out of poverty and create wealth (African Union 2007; United Nations Educational Scientific and Cultural Organisation 2013). TVET is perceived to have very important roles in the education landscape of South Africa (Swiss-South African Cooperation Initiative 2012). Research in South Africa shows that some practical learning initiatives like WIL could improve TVET college to work transitions (Papier 2017). In the same vein, Tikly (2013) supports the view that the TVET sector has a pivotal role in providing the workforce needed by the industry as its role is to prepare learners for sustainable livelihoods. Billett (2013) posits that WIL in Australia is required for professional accreditation, particularly in the education profession. WIL is therefore considered a capstone experience in the transition to professional practice (Tummons 2016).

Therefore, the South African National Development Plan (NDP) aims to produce 24000 artisans by 2020 based on TVET colleges, producing high calibre artisans (Department of Higher Education and Training 2015a). The vocational education systems in South Africa need to be reformed, including giving more power to shape policy, quality assurance systems and funding (Allais and Shalem 2018; McGrath *et al.* 2020). Since 1996, the then FET college sector in South Africa has been in transition, transforming the quality of delivery and making the sector more reactive to current needs (Akoojee, McGrath and Visser 2008). In this notion, industry echoed the need to provide more prominence to the practical aspects of the TVET syllabi (Department of Higher Education and Training 2022). The search for industry currency has led to the burgeoning of higher education initiatives to improve the delivery of TVET education, of which the TVET lecturer WIL is one component. It does appear that the (DHET, 2013) Policy on Professional Qualifications for Lecturers in TVET focused on numbers and expansion, ignoring the current context in which TVET colleges find themselves, which include teaching and learning deficits and under-resourcing in the TVET colleges (Akoojee 2016). Resourcing TVET colleges entails equipping them with both high range equipment and qualified lecturers who can fulfil the mandate of TVET.

TVET is an essential link between schooling and the world of work, and the Department of Higher Education and Training (2014b) regards it as the cornerstone of national skills development. TVET colleges' responsibility is to offer people skills that would lay a basis for higher education, expedite the change-over from school to work and develop self-sufficient learners (Billett 2019). Department of Higher Education and Training (2009) reiterates a significant concern in the state of college lecturers' qualifications and puts to the open that some TVET lecturers are still academically under/unqualified. In this view, it appears that some intensive training of TVET college lecturers by universities, industry trainers, or in collaboration with countries that exhibit high levels of technical education could be a way to support the WIL initiative.

There has been a massive expansion in the South African TVET sector (Powell 2012). While TVET increases its provision, on the one hand, there are challenges related to lecturer knowledge and practical skills deficits. Swiss-South African Cooperation Initiative (2016b) admits a lack of industry support for TVET lecturer learning. Balfour *et al.* (2015) reiterate that some lecturers are not trained to teach or are not trained in the areas they currently teach. Blom (2016b) puts forward that the TVET sector is forced to appoint lecturers from its graduate ranks because no other trained personnel are available. Blom's assertion immediately above suggests that TVET lecturers lack industrial exposure since they are employed directly from college without gaining any modicum of experiential training in the industry.

The government recapitalised the South African TVET college sector to modernise and improve facilities. The TVET sector enrolments have increased from 350 000 to 650 000 in just three years (in the years 2010 to 2013). The numbers are set to further increase considerably by 2030 to have head-count enrolments of 2 500 000 in TVET colleges and one million in the community colleges (Department of Higher Education and Training 2014a; Blom 2016a). In reaction to these developments, Blom (2016b) laments that these quantitative targets are as distressing as they are laudable because while high numbers show growth, there are inadequate resources to support such growth concerning qualified TVET lecturers.

DHET has engaged SSACI to collaborate with public and private sectors to bring resources together and provide policy and programmatic support so that unskilled TVET lecturers could be up-skilled (Swiss-South African Cooperation Initiative 2012; Duncan 2017). Apparently, SSACI plays a significant negotiator role in fostering sustainable college-industry partnerships so that the TVET curriculum is aligned to the needs of the industry, among others, through equipping the TVET lecturers with relevant industrial experience. Since students are trained to work in the industry, WIL equips lecturers with up-to-date skills to fulfil this goal. The following section dwells on the research focus and questions.

1.6 RESEARCH QUESTIONS

The study seeks to understand the nature of TVET lecturer learning through WIL. Therefore, the critical research questions guiding this case of three TVET colleges in KwaZulu-Natal (KZN) province are:

- How do TVET lecturers learn through WIL?
- What are the kinds of knowledge that TVET lecturers gain through WIL?
- What are the conceptions of TVET lecturers' learning through WIL?
- What could be a suitable model for TVET lecturer WIL implementation?

1.7 THEORETICAL FRAMEWORK

My study was guided by Kolb’s (1984) Experiential Learning Theory (ELT) and conceptual frameworks on domains of teacher knowledge by Shulman (1987) and soft skills as outlined in my soft skills **Figure 5** (see pp. 83) in Chapter 3. Common among the proponents of soft skills (Cline 2005; Ellis, Kisling and Hackworth 2014; Ibrahim, Boerhannoeddin and Bakare 2017) were computer skills, communication, listening skills, teamwork, work ethics and problem-solving skills. Kolb’s theory draws from the immense contributions of authorities such as Dewey (1938), Lewin (1946), and Rogers (1985). Kolb’s theory portrays experiential learning as appearing in four stages: concrete experiencing, reflective observation, abstract thinking and active experimentation (Kolb 2007).

I used the conceptual frameworks related to domains of teacher knowledge to understand what knowledge these TVET lecturers learnt. Domains of teacher knowledge were initially advanced by Shulman (1987) as content knowledge (CK), general pedagogical knowledge (GPK), curricular knowledge, pedagogical content knowledge (PCK), knowledge of learners and their characteristics, knowledge of educational contexts, knowledge of purposes, educational purposes and educational values and their philosophical and historical bases. From all the domains tabled by these authorities, I discuss general pedagogical knowledge, curriculum knowledge and knowledge of contexts, which are immediately relevant to my study on TVET lecturer learning during WIL.

The industry placement theoretical model complements Kolb and helps to unpack the experiences gained by the TVET lecturer through WIL in the industry. The theoretical model on Placement in Industry by Bergami and Schuller (2009) is described by six boxes showing the steps connected around the circle of a community of practice aspects that may arise from lecturer placement in industry. Bergami and Schuller (2009) suggest that the engagement between lecturers and industry should enable the formation of a community of practice. The community is the workforce that the lecturers meet in the industry to make diverse contributions in the industry. In this context, both industry personnel and the TVET lecturer on industry WIL contribute to production in a particular industry. The model's stages are: Teacher Industry Placement, Industry Placement Experience, Industry Placement Skills, Theory Development (from Practice), Classroom Teaching, Theory into Practice, Community of Practice and Community Engagement. The issues around the methodological approach are outlined below.

1.8 METHODOLOGICAL APPROACH

This study's research methodology comprises the research paradigm, research design, research approach, data generation, and analysis. In addition, population and ethical issues are interrogated in this chapter. I start with the paradigm.

1.8.1 Paradigm

I adopted an interpretive paradigm that points to how I generated data and analysed it. The WIL for TVET lecturers was explored within the interpretivist paradigm to understand what they learnt and how they did it from their subjective experiences. I relied on the participants' views, meanings and experiences of WIL. Thus, interpretivism deals with understanding the world from individual experiences and perspectives of the researched (Kelly, Dowling and Millar 2018) and, in this case, understanding TVET lecturers learning during WIL. The research design follows.

1.8.2 Research design

I adopted a case study design. The research design suggests how data were generated, what instruments were employed, how the tools were used, and how to analyse the generated data. My study was carried out in three TVET colleges in KZN province. I, therefore, adopted a multiple case study given that the study was carried out in three sites. In the three cases in KZN province, I focused on three different programmes: mechanical, electrical and civil engineering, to obtain cross-programme comparisons. The following segment deals with the research approach.

1.8.3 Approach

The study employs a qualitative approach. Qualitative research is often framed using words or open-ended questions in questionnaires and interview questions (Creswell 2013). "Qualitative researchers study things in their natural settings, attempting to make sense of, or interpret phenomena in terms of the meanings people bring to them, personal experience and their routine and problematic moments in life" (Denzin and Lincoln 2018: 2). The study strove to understand lecturers learning on WIL in a social context. I followed the lecturers in their natural settings - the industries - to find out how and what they learnt and the conceptions of their learning during WIL. The approach is flexible because it allowed me to make the necessary modifications to improve my research instruments, ultimately improving my data generation. Population and sampling issues are highlighted in the following sections.

1.8.4 Population and sampling

The population for this study was lecturers in the three TVET colleges who either are on WIL or have completed WIL in KZN province. At least six months after their completion of WIL, lecturers were approached to capture their detailed experiences while their experiences were fresh. The industry personnel hosting the lecturers on WIL formed part of the population. This convenience sampling method was chosen in this study on proximity and affordability as I work at one of the TVET colleges in KwaZulu-Natal Province. Purposive sampling focused on characteristics of the TVET lecturer population of interest, like lecturers on WIL and lecturers who completed WIL, which best enabled me to answer the research questions. The data generation techniques that I used are highlighted below. Data saturation was achieved after interviewing nine industry personnel and eighteen lecturers and observing the eighteen lecturers.

1.8.5 Data generation

Face-to-face, semi-structured interviews and non-participant observation were used to generate data. The lecturers on WIL and those who completed WIL within six months were the purposefully identified participants. Company personnel who engaged with lecturers on WIL formed part of the participants. The data analysis procedure is explained below.

1.8.6 Data analysis

Data were analysed thematically by identifying patterns (inductive analysis), transcribing the voice-recorded tapes, organising and indexing the data, coding (deductive analysis), developing themes, juxtaposing the relationships amongst the different themes, and developing an interpretation of meaning. The following ethical guidelines direct this research.

1.8.7 Ethical considerations

Ethical standards were observed and maintained throughout the research process. The confidentiality of data generated from research participants was maintained by ensuring that only my supervisors accessed participants' responses and myself and avoided anyone outside the research from linking participants with their responses. Ethical consideration is essential to avoid loss of dignity, harm and risk, privacy, self-esteem and independence of the participants (Shamoo and Resnik 2009). I was considerate, professional and allowed participants to set dates convenient to them. Further, I also avoided unnecessary extensions and keeping participants in discomfort by keeping appointment schedules and using neutral venues. I applied for ethical clearance from the Durban University of Technology. I sought permission from DHET and college principals to research the three nearest and available TVET colleges in KZN province. I gave all participants information letters and consent forms to confirm their willingness to participate in the research. Sin (2005) stresses that research participants should freely give informed research consent after providing sufficient information on what is required from them and any possibilities of risks that they may experience by participating in the research. Any travelling costs that participants incurred in the process of the interviews were refunded in full. Below is the thesis outline, which concludes this chapter.

1.9 CHAPTER SUMMARY AND OVERVIEW OF THE THESIS

The chapter introduced the study on the nature of TVET lecturer learning through WIL. The study focus and purpose were outlined, and the research question was defined. The ethical considerations concluded the chapter. The thesis is comprised of nine chapters, as outlined below:

Chapter One: Introduction and overview

The chapter introduces the study by providing a synopsis of the whole study. Key aspects include the background, context, rationale, problem statement and purpose. My study was located within the South African and international contexts. The chapter presents critical questions that the research intended to answer. A motivation to undertake my study is also provided.

Chapter Two: Literature Review

Literature is surveyed to establish what scholars have identified about TVET lecturer WIL internationally, regionally, and in South Africa. The definitions of TVET and WIL are given in this chapter. The study explores what and how TVET lecturers learn through WIL and determine how they understand their learning.

Chapter Three: Theoretical and Conceptual Frameworks

This chapter examines the theoretical framework of Experiential Learning Theory by Kolb (1984), which foregrounds my study. Also, I used conceptual frameworks related to domains of teacher knowledge by Shulman (1987), which was also expanded by Grossman (1990), to understand what knowledge the TVET lecturers learn. Furthermore, the industry placement theoretical model by Bergami and Schuller (2009) also complemented Kolb as it helped to unpack the experiences gained by the TVET lecturer during WIL. Finally, another conceptual framework on soft skills concludes chapter 3.

Chapter Four: Research Methodology

The chapter discusses the research methodology. It elaborates on paradigm, research design, approach, instruments, data analysis and ethics. A thorough description of all the steps in the method is given and supported by relevant literature. In concluding the chapter, trustworthiness, credibility, transferability, dependability, confirmability and triangulation are discussed. Finally, the welfare of participants and their protection is conveyed by a comprehensive discussion on ethical considerations.

Chapter Five: Research Sites

The three research sites in KwaZulu-Natal province are discussed. The selection of these research sites was decided on their proximity to the researcher. These sites are government colleges that rely solely on state funding. They form part of the 50 TVET colleges in South Africa. A brief profile of the TVET colleges and their programme offerings, geographical locations, and economic contexts are discussed. Each site may have its unique set-up and a different number of campuses and staff complement. The main reason for the selection of these sites was a matter of access.

Chapter Six: Data Analysis and Interpretation

The results and analysis of the interviews for question 1 on the nature of TVET lecturers learning through WIL are presented, leading to themes and sub-themes. The role played by the lecturer in the industry was put to the fore. The results clarify the relationships among the different themes.

Chapter Seven: Data Analysis and Interpretation

The results and analysis of the interviews for question 2 on the kinds of knowledge gained during WIL are reported. The role played by the lecturer in the industry is outlined.

Chapter Eight: Data Analysis and Interpretation

The chapter analyses the interview results for question 3 on the conceptions of TVET lecturers' learning through WIL. The conceptions are explained through themes and sub-themes. The issues that emerged from the discussion of findings conclude the chapter.

Chapter Nine: Conclusions, recommendations and limitations of the study

This final chapter presents conclusions regarding the findings and possible recommendations for further research on TVET lecturer learning during WIL. Recommendations are suggested from an informed perspective to enhance TVET lecturers' industry experiences. A summary of the main findings from critical relevant literature and qualitative data analysis is presented. The contribution and conclusion of the study are also identified and justified based on the research questions.

According to the Harvard referencing style, a reference list of cited sources throughout the thesis was presented in alphabetical order of the author surnames. Finally, additional necessary information to the study is attached and numbered accordingly for easy referencing.

The following chapter presents a literature review of studies that have a direct connection to this research from the global, regional and local perspectives.

CHAPTER 2: LITERATURE REVIEW

2.1 INTRODUCTION

This chapter presents a review of relevant literature focusing on TVET lecturer learning through work-integrated learning (WIL) to establish the nature of their learning, the kinds of knowledge they gained during WIL, and how they understood their learning. In the previous chapter, I explained the contextual background of my study. The concept of TVET in South Africa is relatively new, so is WIL in the form of industrial attachment. The study explores studies conducted globally, regionally and nationally on TVET lecturer WIL. In so doing, the study should disclose the gaps in it (Maree 2012). This literature review aims to identify gaps in other scholars concerning TVET lecturer WIL. It locates the study within the broad ongoing dialogues on the WIL and its utility (Marshall and Rossman 2011). This chapter examines the literature on the three themes below. Wedekind and Watson (2016) and Blom (2016b) acknowledge a dearth of formal research literature on the TVET Colleges in South Africa and TVET college lecturers. Therefore, some of the research literature that I had to rely upon focused on students learning through WIL. Literature in this study is organised conceptually, and within those concepts, I followed a funnel approach.

This review aims to discuss the following themes:

- Definition of concepts, WIL and WRL
- How do TVET lecturers learn through WIL? (Nature of their learning)
- The kinds of knowledge that TVET lecturers gain through WIL
- Conceptions and perceptions of TVET lecturers' learning through WIL.

2.2 DEFINITION OF CONCEPTS

To address industry skills development, there have been ways of fostering more participative, situated and industry work-oriented learning (Council on Higher Education 2011). Working to learn and learning to work is described in different ways. WIL is often used interchangeably with problem-based learning (PBL), workplace learning, work-related learning (WRL), project-based learning (PBL), practicum, experiential learning, internship, and industry placement, to name a few (Moore 2010, 2013; Cantalini-Williams *et al.* 2014; Peters, Sattler and Kelland 2014). The segment below explains WIL.

2.2.1 Work-integrated learning (WIL)

Engel-Hills *et al.* (2010) and Govender and Våland (2021) describe WIL as an educational approach aligning academic and workplace practices for the benefit of students and the workplace. WIL is a pedagogical practice whereby students integrate experiences in educational and workplace environments (Billett 2013, 2019). WIL is, therefore, an educational approach that focuses on relevant work-based experiences to integrate theory with practice. Dewey (1938) in Council on Higher Education (2011) affirmed that people learn by doing and that genuine learning is achieved through experience. WIL describes an approach to career-focused learning, which is generally appropriate for vocational/technical/professional qualifications. It is, therefore, a learning process focusing on the application of theory in an authentic work environment. Therefore, WIL is described as "an overarching 'umbrella' term used to describe planned educational approaches" (Fleming and Haigh 2017). The table below accentuates the modalities of WIL.

Table 1: Description of WIL

Description of WIL	
Work	Specialised field or discipline, e.g. civil, electrical, mechanical
Integrated	From the classroom to the workplace Theory and practice Policies on company practice vs college institution
Learning	Knowledge Skills Attitudes and values

Source: Developed from Govender and Våland (2021).

Notes: The table shows a description of WIL. Each word of the term WIL is described in terms of what it represents in WIL. In this study, the term WIL is utilised throughout the discussion.

2.2.2 Workplace learning

Workplace learning occurs when students are engaged in work environments for learning. Workplace learning usually involves students in the planning and implementation process of activities (Baerheim and Raaheim 2020). Workplace learning is based on Kolb's (1984) ELT. The learning cycle proposes repetitive series of processes that underlies learning. The four stages are explained in the theory chapter. During work placement, students consider how they put what they have learnt into practice (Gosling and Moon 2001).

2.2.3 Problem-based learning

Problem-based learning (PBL) focuses on making changes so that practical problem-solving takes ownership of a structured practical learning process rather than theory (Council on Higher Education 2011). PBL is a problem-oriented learning process that includes real-world activities and assignments (Council on Higher Education 2011). The success of PBL is based on the strength of tasks that are performed. Otherwise, it can be less effective a process.

2.2.4 Experiential learning

Experiential learning is considered to represent certain techniques that people can use to acquire knowledge. The learner is in direct contact and encounters the realities being studied. Kolb and Kolb (2018a) and (Schön 1987) explain experiential learning as a process that integrates knowledge, activity in real industry and reflection. Through experiential learning, there is the possible formation of relationships and networks with industry personnel. Moore (2013) explains that there are different forms of experiential learning like internships, cooperative education, practicum, fieldwork and many more.

Even though different terminology is used to explain different programmes of workplace practice, all of them are based on a general understanding of the value of enabling the integration of theory with practice through an intense industry environment context. Therefore, WIL is a broad term that involves various learning opportunities centred on integrating theory with practice in the industry (Peters, Sattler and Kelland 2014; Rowe 2017). This justifies the choice of using WIL in the study.

2.3 HOW TVET LECTURERS LEARN THROUGH WIL

The study aims to explore TVET lecturer learning through WIL, specifically to establish the nature of their learning, the kinds of knowledge they gain, and how they understand their learning. TVET is defined as studying technologies and related sciences, acquiring practical skills, knowledge, and understanding related to occupations in various economic and social life sectors (United Nations Educational Scientific and Cultural Organisation 2013; Blom 2015). Therefore, TVET lecturers need practical skills in their respective fields of expertise. This section assesses the work of other scholars on the nature of learning in industry. The nature of learning and engagements that these TVET lecturers experience remain to be established in this study. The literature from a global context on the nature of TVET lecturers learning through WIL is presented below.

2.3.1 Global context on how TVET lecturers learn through WIL

From the international perspective, scholars like Alias, Sofyan and Triyono (2020); Khuzainey *et al.* (2020) and Ahmad and Rashid (2011) conducted studies on vocational teachers and lecturers' experiences on industry attachment. More studies from Australia and Malaysia were noted, possibly because of better programme funding policies and sound management systems. Each of them is presented and analysed below.

Ahmad and Rashid (2011) explored industrial attachment for lecturers in Malaysia. Malaysia introduced a lecturer industrial attachment programme to increase lecturers' soft skills. The focus of the study was to broaden lecturers' knowledge and experience through industrial attachment. The study used structured interviews to generate data from a random sample of lecturers who studied industrial attachment for lecturers. Using a random sampling technique suggested that there were many lecturers to sample from, yet my study was limited to the few available TVET lecturers. Relatively few lecturers in South Africa have engaged in industry WIL, so the selection has to be purposive to target those few available lecturers.

I used purposive sampling and included all student lecturers on WIL from the selected colleges. The study (Ahmad and Rashid 2011) established that lecturers learnt from being exposed to several work areas like technical, maintenance, operation and management. If TVET lecturers go through all the relevant sections of their trades, it remains to be seen if they could be exposed to such different experiences during WIL. Ahmad and Rashid's study reported that the attachment programme helped elaborate on theoretical aspects more effectively and relate them to technology's latest developments. The study verified that learning from experience is the best and the experience gained is indispensable (Ahmad and Rashid 2011). While it is so, Jackson *et al.* (2017) revealed that host employers experienced challenges with students who had a low practical performance and also indicated a lack of collaboration between employers and colleges. However, my study's difference was that researchers did not get views of the industry regarding lecturers' experiences. My study included industry personnel from host companies where lecturers were attached to get their views about the nature of TVET lecturer learning during WIL.

Supporting this discussion, Sariwati and Mazanah (2010) also conducted another study in Malaysia, focusing on students. They investigated students' learning processes during their industry practical training to understand how they learn, what they did, and what experiences exerted an impact on their learning (Sariwati and Mazanah 2010). Even though the purpose of the study matched my study, the participants were different as I studied TVET lecturers and industrial personnel. A qualitative design approach was employed to explore students' industrial training, which used an in-depth interview technique to generate data from purposively selected participants. Similar to my study, thematic data analysis was employed to analyse the data. Sariwati and Mazanah (2010) reported that participants learnt new knowledge, skills, values, and the application of skills in real-life situations.

Furthermore, participants acknowledged active participation in work activities with close supervision, learning through observation and problem-solving. The study also expressed that participants rotated in different company sections every month to learn different operations. The findings from the literature dovetail with Gregory, Bolling and Langston (2014), who discovered that interns rotated through all specialist department services and learnt to observe and link the operations of each department. There was a positive working relationship with company personnel, where participants shared their experiences with keen enthusiasm (Sariwati and Mazanah 2010). In contrast, Kintu, Kitainge and Ferej (2019) observed that internship experiences at some Engineering companies were marred by repetitive tasks, which was discouraging. Overall, different skills were gained during the workplace experience. My study sought to find out if TVET lecturers gained knowledge and experienced practical industry skills through training.

Again, from Malaysia, Khuzainey *et al.* (2020) conducted a recent study that focused on equipping knowledge and skills consisting of maintenance, inventory of machines, hand tools and works planning to vocational teachers. A total of 1186 participants were involved in the study, while I used only 27 participants. The high number of participants suggests that many vocational teachers were exposed to Malaysia's industry skills. The random sampling technique was also used by Ahmad and Rashid (2011) above. The generated data were analysed using Partial Least Squares analysis software, whereas I used thematic data analysis.

Using software for data analysis provides a more predictive accuracy. However, thematic analysis allowed me to immerse into the data to understand the phenomenon more. The results showed that vocational teachers could identify suitable materials, handle and explain the function of hand tools, machines and equipment, design and interpret drawings and work on a maintenance schedule (Khuzainey *et al.* 2020). Further findings also disclosed that vocational teachers could assess students' practical work, explain the step-by-step practical processes, explain troubleshooting, explain safety practices in the workshop and describe the latest technology found in the industry. The findings align with Fjellström (2014), who concluded that the students on work-based learning highly valued the drawings because they gave working instructions. Khuzainey *et al.* (2020) focused on vocational teachers alone, similar to the study by Ahmad and Rashid (2011) above, whereas my study involved TVET lecturers and industry personnel. My study investigates whether TVET lecturers were able to gain all the skills during WIL.

Alias, Sofyan and Triyono (2020) conducted a study in Indonesia on an industrial internship model to improve prospective vocational teachers' skills. The study aimed to develop a new institution-industry partnership model so that vocational teachers received the latest industry insights. The study adopted the design and development research methodology proposed by Richey and Klein (2007). In-depth interviews generated data from focus group discussions involving four industry personnel, four vocational lecturers and four academics from the teacher training institutions, an assessment sheet and a closed questionnaire for industry feedback from the vocational teachers. Data were analysed both qualitatively and quantitatively as it appeared, while all my data were analysed qualitatively. Quantitative methods analysis is useful in understanding the contradictions between quantitative results and qualitative findings. I generated data using in-depth interviews and non-participant observation.

The findings showed evidence that vocational teachers received hands-on experience from the new equipment and technologies used in the automotive industry (Alias, Sofyan and Triyono 2020). About 76% of vocational teachers agreed that they had received adequate skills, understandably because the purpose of industry was profit-oriented, service provision and pursuing company targets (Alias, Sofyan and Triyono 2020). In another study, Trede and McEwen (2015) confirm that participants received varied workplace experiences during WIL. Martin and Rees (2018) support that WIL provides comprehensive industry skills required by employers for successful workplace delivery. All vocational teachers attached to one workshop scored 100% on the suitability of material, mentor guidance and internship contribution because there was an existing partnership between the institution and the industry with a training centre with certified instructors (Alias, Sofyan and Triyono 2020). Some participants were attached to companies with a well-laid foundation for training vocational teachers, which is yet to be proven through my study if lecturers gained these skills. Malaysia is a developed country compared to a developing South Africa. Therefore, my study findings explain the similarities and differences in the two contexts.

In Australia, Clayton (2013) investigated TVET lecturers' industry knowledge and skills and how to keep the skills abreast with industry needs. The areas of specialisation for the lecturers were plumbing, printing and hairdressing. Data were generated using semi-structured interviews from 22 stakeholders who were specialists in plumbing, printing and hairdressing. They comprised 14 employers, 2 TVET auditors, 3 industry association representatives and 3 industry skills council representatives. The participant results indicated that TVET lecturers updated their skills and knowledge by using new equipment, attending tradesmen events, conferences and seminars, industry networks, industry-specific magazines and news bulletins. Clayton’s findings concurred with Smith and Yasukawa (2017) in Australia, who discovered that VET teachers gained deep industry knowledge and technical authority. This finding implied that the VET teacher could earn the confidence and trust of students. Zack (2003) descriptor for a knowledge-based organisation was used for this study, while I used Kolb's Experiential Learning Theory (ELT) and conceptual framework on teacher learning. The study is relevant in that TVET lecturers are the central focus in both scenarios. Since Australia is highly developed, it offered a different setting where the study was conducted. It is yet to be proven through my study if lecturers gain these skills.

Still in Australia, a more recent study was conducted by Redmond (2017), who examined Vocational Education and Training (VET) student practitioners' experiences. The difference with the study by Clayton (2013) lies in the methods of data generating used. The article used an online survey to generate data, while my study uses semi-structured interviews. An online survey breaks the distance barrier; therefore, participants can be reached from anywhere. However, face-to-face interviews, which I used, allowed me to explain complex questions to the interviewees. Interviews allow identification of relevant non-verbal clues, which may be difficult to see through an online survey (Phellas, Bloch and Seale 2011). The specialisation areas for the 147 practitioners who completed the survey included engineering, hospitality, retail and business administration, while my study had 27 participants: 18 TVET lecturers and 9 industry personnel. Even though data analysis was both qualitative and quantitative, the results were reported descriptively. Redmond's findings clarified that practitioners identified ways to build on current knowledge and skills, which developed their subject content knowledge (Redmond 2017). While the study showed that student practitioners developed information technology skills, self-reflection and a more theoretical underpinning to vocational education, my study focused on TVET lecturer learning through WIL practice. The article did not answer the nature of learning through industry placement, which is my study's focus.

Wandahl and Ussing (2016) studied students' industrial placement in Denmark's construction engineering industry. They investigated the industrial placement of construction engineering students to understand what they learnt. A questionnaire was piloted among the colleagues leading to adjustments in some of the questions. The questionnaire generated data from 200 third-year civil engineering students. Similar to the study by Redmond (2017) immediately above, the questionnaire distribution was through an online Survey XACT database which also broke distance barriers and could be sent to many people at one time. Probably, the research context promoted the use of an online questionnaire. Literature reports the disadvantages of a questionnaire, such as low response rate and interpretation of questions (Delgado-Hernandez and Aspinwall 2005). My study used purposively selected TVET lecturers because they are few. The results exposed that the host employer's supervision was rare and did not increase their learning outcome during WIL.

Participants confirmed that theoretical knowledge in construction processes, concrete structures, CAD and civil works were the most relevant preparation for industrial placement. The findings were in tandem with Olorunfemi and Ashaolu (2008), who supported that AUTOCAD and information technology skills were necessary skills acquired during industry work experience. The industrial placement experience offered additional skills and competencies, which were impossible in a classroom setting (Wandahl and Ussing 2016). The findings further uncovered that participants also gained personal skills and self-confidence during WIL. The finding agrees with Davids (2006), who indicated that participants gained self-confidence and professional development during training. However, the research differed from my study in that I investigated TVET lecturers while Wandahl and

Ussing (2016) focused on construction engineering students. My study strove to establish the nature of TVET lecturer learning during WIL.

Virkkula and Nissilä (2014) studied in-service teachers' learning from integrating theory and practice in Finland. The qualitative study investigated vocational teachers' experiences concerning professional competence and pedagogical development during their work placement periods. A theoretical framework (Engeström 2001; Bergami and Schuller 2009; Mezirow 2009), similar to mine, was used to explain the findings. The findings disclosed that all vocational teachers created interaction with the industry, which widened their expertise (Virkkula and Nissilä 2014). Further, vocational teachers were faced with many new skills to get substance knowledge, and they did different kinds of work during the placement period. The findings also reported that vocational teachers are better equipped to guide and prepare the students for work contexts (Virkkula and Nissilä 2014). My study also used the teacher placement in industry model by Bergami and Schuller (2009), which noticed that practical work structured the knowledge and skills needed and added commitment to more responsible tasks.

The following section explores literature on the nature of TVET lecturers learning through WIL (how they learn) from a regional context.

2.3.2 Regional context on how TVET lecturers learn through WIL

The regional perspective includes developing countries in Africa like Zimbabwe, Ghana, Kenya and Uganda, where a common trend of using a questionnaire was noted. Participants included lecturers, students and industry personnel. The analysis of each study visited unfolds below.

Giving an account of the TVET lecturer learning in Zimbabwe, Mabhanda (2017) researched industrial attachment for college lecturers. The research sought to encourage lecturers in the polytechnic institutions to engage themselves in industrial training. The study was a quantitative approach where data were generated using structured open-ended questionnaires and focus group interviews. A questionnaire limits participants from expressing their feelings and emotions. Therefore, interviews in my study are designed to yield different results. Participants involved in the study were twenty-six purposively and randomly selected lecturers from different divisions. The results showed that lecturers' attachment equipped them to develop teaching and learning materials for their specialisation areas (Mabhanda 2017).

Mabhanda stated that lecturers who go for WIL were better placed in competence and knowledge and made pedagogical delivery easy (Mabhanda 2017). Mabhanda's assertion aligns with Ahmad and Rashid (2011) findings earlier that lecturers become fully conversant, and delivery becomes easy. Lecturer WIL enables the lecturers to become knowledgeable about the needs of the industry. Mabhanda (2017) adds that WIL is another key that helps to prepare students better to comprehend specific discipline competencies. The study also showed that industrial attachment for lecturers could be promoted through college-industry workshops on TVET, trade exhibitions, conferences and symposiums. Contrarily, Jackson *et al.* (2017) raise concerns about company confidentiality and the need for effective industry-college collaboration to safeguard WIL experience and outcomes. Mabhanda's results were similar to those of Clayton (2013) in Australia. However, my study is yet to show how the lecturers learnt and what they learnt through WIL in the South African context.

Ghana introduced supervised industrial attachment for TVET lecturers hosted in industry to acquire practical skills by learning from new machinery and the latest technology. Four years later, Donkor, Nsoh and Mitchual (2009) conducted a study on supervised industrial attachment in Ghana. The results showed that all participants agreed on the usefulness of the program. Donkor, Nsoh and Mitchual (2009) reported that studies of industrial attachment in a TVET setting are not much reported. Therefore, my study adds another dimension to the literature on TVET lecturer learning during WIL. The study is similar to mine in that both studies focused on TVET lecturers and industry personnel. However, the lecturers studied were fewer than my sample. Furthermore, my study did not investigate students.

Concerning WIL, Adjei, Nyarko and Nunfam (2014) in Ghana conducted a study on students' industrial attachment where 85 industry personnel working directly with students on attachment were purposively selected, and 118 senior members were directly involved in planning the attachment programme. The paper aimed to examine industrial attachment in polytechnic education as a human capital development approach. While mixed methodology and explanatory research designs were used in the research article, I used a qualitative approach. Unlike my study, which used thematic data analysis, Adjei, Nyarko and Nunfam (2014) used descriptive statistics to analyse qualitative and quantitative data, and the data were processed using Statistical Product and Service Solutions (SPSS) software. Descriptive statistics can generate reports and charts and show trends, whereas thematic analysis describes and narrates data by juxtaposing the relationships among the different themes. The senior members (61%) confirmed that the industry allowed lecturers to sharpen their skills and knowledge through industrial attachment Adjei, Nyarko and Nunfam (2014). A majority of participants (92%) were optimistic that the industry provided practical training for polytechnic students Adjei, Nyarko and Nunfam (2014). In my study, I investigated the nature of TVET lecturer learning during WIL to generate whether TVET lecturers had the same opportunity to gain industry practice during WIL.

A recent study by Mulati, Kyalo and Dimo (2019) also explored students' skills acquisition and industry-TVET collaboration in Kenya. The study explored the effects of a collaboration of industry-TVET institutions on the acquisition of skills. A case study design was adopted, which was similar to my study. Lecturers and students were selected using stratified proportionate random sampling, while industry supervisors were selected using purposive random sampling. Most lecturers (94%) stated that industry-TVET collaboration exposed students to new technologies and real work setup, while 83% of students confirmed learning about their courses' latest developments through industry-TVET collaboration (Mulati, Kyalo and Dimo 2019).

Further to that, students could operate machines and equipment and accomplish practical assignments given by their supervisors. The findings also reported that company supervisors confirmed that students acquired new skills related to their courses. The participants used in this article are similar to the participants in my study. However, my study establishes whether these findings are similar to Mulati, Kyalo and Dimo (2019). Common among the above regional researches by Mulati, Kyalo and Dimo (2019), Mabhanda (2017), Adjei, Nyarko and Nunfam (2014) and Donkor, Nsoh and Mitchual (2009) was the use of different types of questionnaire. It could be because a large amount of information could be generated from a large number of people in a short period and in a cost-effective way.

Concerning learning industry skills, Kintu, Kitainge and Ferej (2019) study of Ugandan TVET graduates explored the approaches to training the TVET graduates for employment in the industry. The study adopted a descriptive survey design. Similar to my study, a qualitative approach was employed to generate data, analyse the data using thematic analysis and present the findings. Thirty participants, including TVET graduates, employers, trainers and other officials from employers' unions and the Ministry of Education, were randomly selected for interviews. The interview guide was piloted on fifteen senior technical teachers. The study was grounded on the self-concept theory of career development, as Super (1990) explained; it involves new understandings and experiences and progresses through developmental stages like self-knowledge, decision-making, planning, and problem-solving. However, my study uses Kolb (1984) ELT and a conceptual framework to complement Kolb.

The findings uncovered that experienced industry personnel trained TVET graduates. Results showed that some TVET graduates acquired many industry skills, which was impossible at a college training workshop (Kintu, Kitainge and Ferej 2019). Some findings indicated that industrial attachment introduced TVET graduates to unfamiliar technology, improved their communication skills, made them appreciate and understand the realities of the world of work and practiced the theoretical principles they learnt at college (Kintu, Kitainge and Ferej 2019). The interviews reported that industry attachment created networking skills and TVET college-industry linkages that would help graduates transition to the world of work. In contrast, a study by Rosly *et al.* (2019) revealed some limitations faced by lecturers during industry training which included a lack of collaboration between industries and TVET institutions. To this end, further studies are necessary to delve into challenges faced during WIL. It remains to be tested if TVET lecturers learning through WIL develop a network with industry during WIL.

2.3.3 South African context on how TVET lecturers learn through WIL

Although there seems to be scant research that focused on TVET lecturer WIL in industry per se, Van der Bijl and Taylor (2019) and Duncan (2017) matched my study. The other studies focused on WIL of student teachers on teaching practicum, such as Barends and Nel (2017) and Assan (2014). An analysis of each of these studies follows below.

A recent study by Van der Bijl and Taylor (2019) explored integrating the world of work into initial TVET teacher education in South Africa and generated data through focus group interviews. The qualitative study employed three theoretical frameworks, which provided the basis for understanding the nature of TVET lecturer industry placement and learning from the workplace to the classroom. These were: teacher industry placement model based on Bergami and Schuller (2009); Engeström (2001) activity theory model and Shulman and Shulman

(2009) model for teacher learning which helped to understand industry-based WIL for TVET lecturers. Similarly, Shulman (1987) and Bergami and Schuller (2009) formed part of my theoretical framework in explaining TVET lecturer learning. Findings showed the nature, requirements and characteristics of TVET lecturers in South Africa. Findings further informed that industry WIL for lecturers consisted of a short time placement to update industry knowledge and skills and redirect the knowledge to their teaching practice (Olorunfemi and Ashaolu 2008; Van der Bijl and Taylor 2019). It implied that industry WIL for TVET lecturers involved reflection on work experiences for inclusion in teaching vocational subjects.

Contrary to this view, other findings showed that lecturers offering practical engineering subjects needed more time in the workplace (Van der Bijl and Taylor 2019). Both studies focused on TVET lecturers learning during WIL. However, my study explores TVET lecturers on a 2-year WIL in the industry to see whether the lecturers could gain all the skills during WIL. My study further explored the views of industry personnel about lecturer WIL.

Confirming the above are findings of a study conducted by Van der Bijl and Taylor (2016), who investigated industry-based workplace experience involving TVET college lecturers in South Africa. Two related frameworks, namely, a community of practice-based model by Lave and Wenger (1991) and Boundary crossing between activity systems by Engeström (2007), provided a basis for understanding TVET lecturer industry placement. Van der Bijl and Taylor focused on participants placed for periods between three and five days, while my study focuses on student lecturers on a two-year WIL period. TVET lecturers may be assumed to gain more skills over a long period. However, the study investigates the outcome of WIL.

Van der Bijl and Taylor (2016) reported that companies needed a long time to gain trust and proof of competence in lecturers before allowing them to work independently. Previous research on lecturer perspectives suggested that competence trust is based on beliefs regarding performing a task (Clifton *et al.* 2020). Apparently, lecturers were involved in production under supervision and helped rather than individual tasks. A similar study suggested that company supervisors lacked the interest to involve students in the actual industry tasks and responsibilities (Birhan and Merso 2021). However, resentment or resistance to permit student TVET lecturers to work independently seems common in hazardous and high-risk workplace settings and works with a direct public image or deals with sensitive financial records (Van der Bijl and Taylor 2016). Companies generally feared that confidential information could leak since the company's laws did not entirely bind lecturers. TVET lecturers take on WIL to develop their knowledge of practice and teaching skills. Nonetheless, my study establishes whether these findings are the same for TVET lecturer WIL in South Africa. Furthermore, my study established whether these findings match those found by Van der Bijl and Taylor (2016).

In another South African study, Duncan (2017) studied TVET lecturer development through engagements with industry. While a large sample size could have increased reliability in Duncan’s study, my relatively small sample conformed to ethical principles and available resources. Faber and Fonseca (2014) comment that an appropriate sample size renders the research more efficient, while Boddy (2016) says that in qualitative research, the determination of sample size is contextual and dependent on the paradigm used for the study. Reportedly, WIL developed, motivated and energised TVET lecturers who learnt much about modern technology, industry systems and procedures. Lecturers felt empowered by the experience of industry exposure and usually wanted more experiences to foster their industry relationships (Duncan 2017). A study in Pakistan showed that internship opportunities positively influenced professional growth and developed fruitful industry experience in real work settings (Anjum 2020). The interests of lecturers differed widely between fundamental subject lecturers and those teaching technical artisan specific trade subjects. Duncan's study found that industry engagements equipped lecturers teaching artisan trades to integrate lessons from industry experience into the classroom skills. While the article relates to my research in that it focused on TVET lecturers engaging with industry, which in my study represent WIL, it is different in that my study went further to explore the views of the industry personnel.

Du Plessis (2019) conducted an in-depth study of student practices in delivering WIL in radiography training at selected universities in South Africa. The qualitative study showed a transfer of knowledge, understanding of radiography's fundamentals, and application in clinical practice (Du Plessis 2019). The findings further reported that the student lecturers who engaged in WIL lacked monitoring from supervisors to check their attachment experiences' suitability. This is supported by Birhan and Merso (2021), who indicate a lack of adequate support and guidance from supervisors in making follow-ups and providing necessary mentoring skills. My study enquires what lecturers learnt during WIL to establish whether they understood their learning.

Nduna (2016) researched TVET lecturers to determine how lecturers learnt during WIL practice in industry settings and address their needs and challenges in South Africa. The WIL approaches investigated included apprenticeships, experiential learning, virtual or simulated WIL learning and more. However, the similarities and dissimilarities of the terms are not apparent (Streumer and Kho 2006; Moore 2010). A brief elaboration of a selection of different terms was given at the beginning of Chapter 2 above. A theory underpinning the notion of WIL was activity theory by Engeström (2001) instead of my study, which used Kolb's theory and a conceptual framework. While online questionnaires can be easily accessible with no cost-based geographical restrictions, it may be challenging to know if one person submits multiple responses or if the answers came from the right person. Furthermore, participants without internet access could be left out. Using face-to-face interviews allowed reaching every participant of choice with the ability to negotiate appointments with participants. Findings from 18 focus group interviews conducted evenly across all provinces indicated that TVET lecturers emphasised gaining more exposure in the industry to keep up with new industry technology.

Participants acknowledged that WIL helped them become better educators through exposure to the industry, which helped relate knowledge to the syllabus (Nduna 2016). One participant commented, "… it is useless to teach our students the curriculum without the knowledge of what the industry needs. With WIL, I can integrate my teaching with the workplace" (Nduna 2016: 292). Furthermore, results presented that WIL improved an understanding of the industry and linked knowledge acquired in the industry with classroom knowledge. Specialist lecturers in electrical engineering recommended training in Programmable Logic Control panels (PLC), Oscilloscope, direct current and single-phase motor training to improve their teaching skills.

Assan (2014) investigated WIL experiences of B.Ed. and Post Graduate Certificate in Education (PGCE) final year student teachers in South Africa. A sample of 50 randomly selected student-teachers from a total of 165 final year students was chosen. The data generated from open-ended questionnaires showed that 23 student teachers had a supportive mentor and received overwhelming support. Sixteen student teachers expressed that WIL gave them confidence (Assan 2014). In-depth interviews and thematic data analysis were similar to my study method. On the contrary, eight student teachers reported that staff was hostile and uncooperative, while another participant showed that some teachers were mocked in a language they could not understand (Assan 2014). This is supported by (Gebeyehu and Atanaw 2018; Gashaw 2019), who indicate bias, bad treatment and unwillingness to give information and resources during the industry in industry practice. On the contrary, Zegwaard *et al.* (2019) describe industry as 'permeable', nurturing robust partnerships which inform authentic student practical experiences. Assan (2014) focused on student teachers on teaching practice while participants (TVET lecturers) in my study were attached to industries to gain practical skills. It is yet to be ascertained if TVET lecturers learning during WIL gained skills and whether the same results from mentors emerged.

Similar to the study immediately above, Barends and Nel (2017) investigated WIL within the reading literacy of the foundation phase teacher preparation programme in South Africa. The study aimed to explore the purpose of WIL in helping the readiness of pre-service teachers to facilitate reading literacy. A conceptual framework characterised by the following seven key dimensions was used: purpose, context, nature of the integration, curriculum issues, learning, partnerships between the college and the workplace, and the support provided to the student and the workplace (Shulman 1987; Lave and Wenger 1991; Cantalini-Williams *et al.* 2014). My conceptual framework also incorporated Bergami and Schuller (2009) model on teacher placement in industry and Shulman's theory on pedagogical content knowledge (PCK). Data were generated using focus group interviews, document analysis and semi-structured interviews and analysed using content analysis while I chose thematic data analysis to explore the relationships among the different themes.

In comparison to my study, I used semi-structured interviews and non-participant observations to understand the lecturers' environment. Findings exposed that teachers had two teaching experiences of three weeks each, observing with limited exposure (Barends and Nel 2017). My study explored what practical skills TVET lecturers learnt in the industry since they engaged for two years. Teachers reportedly applied their knowledge during WIL on how to integrate their knowledge of theory and practice. The results noted a lack of alignment between classroom teaching reality as the student teachers failed to manage their classroom routine in literacy content (Barends and Nel 2017). Lastly, the teachers reported learning from mentoring during WIL and that they learnt more from observing teacher teaching than from theory, making the practical experiences vital. While this study focused on WIL (teaching practice) teachers, my research focused on TVET lecturers learning through WIL in industry. The contexts are different.

Mgijima (2014) conducted a study in South Africa focusing on competency-based training needs for TVET lecturers. Data were generated using questionnaires and focus group discussions from a total sample of 373 TVET lecturers who were purposively selected, compared to my study with 27 participants. While my research had lecturers and industry personnel, the article focused on lecturers and academic managers. The research analysed data using SPSS software, whereas my study used thematic analysis. Although interpreting results is relatively easy when using software, it does not provide an understanding of the issues in depth. It emerged that those TVET lecturers who attended workshops gained communication technology skills, content knowledge and professional learning networks. From the TVET lecturer placement in the industry, my study establishes if lecturers gained industry skills through WIL.

In reference to the local perspective, the nature of TVET lecturers learning through WIL used TVET lecturers and students as participants and focused on their learning in different fields and contexts. Eight studies looked at the industrial attachment for TVET lecturers. Industrial attachment for students in TVET colleges and universities appeared in six studies. One article focused on students learning from teaching practice. From these studies, I learnt that TVET lecturers' attachment programme helped them elaborate on theoretical aspects more effectively and relate them to technology's latest developments than they could before the attachment. TVET lecturers updated their skills and knowledge using new equipment and techniques used in industry, attending tradesmen events and industry networks. From the studies where students were on teaching practice, I learnt that they also experienced WIL through exposure to their profession's realities. The studies, including TVET students on industrial attachment, introduced them to unfamiliar technology, which helped them appreciate the real world of work and practice the theoretical principles they learnt at college to transition to the world of work. The next section discusses the kinds of knowledge that TVET lecturers gain through WIL.

2.4 THE KINDS OF KNOWLEDGE THAT TVET LECTURERS GAIN THROUGH WIL

This section focuses on the kinds of knowledge that TVET lecturers gain in the industry through WIL. Amedorme and Fiagbe (2013) reiterate that there are generally few TVET lecturers in Ghana. Of these few lecturers, there are serious gaps in practical industry experience. In other words, these few lecturers lack industry exposure, i.e., WIL. To mitigate this challenge, Ghana proposed establishing a college of technology education to give lecturers industry exposure in their technical areas. Similarly, SSACI introduced lecturer WIL to address lecturer industrial exposure and experience through WIL.

Moreover, the lecturers were unfamiliar with technological advancements and the current working methods in modern workplaces (Blom 2016a). The current South African study tries to determine what they learn, which may include advanced technology. In trying to find answers to the kinds of knowledge gained by TVET lecturers during WIL, I applied Shulman's model on domains of teacher knowledge. The domains are content knowledge, general pedagogical knowledge, curricular knowledge, pedagogical content knowledge, knowledge of learners and their characteristics, knowledge of educational contexts, knowledge of educational ends, purposes and values, and philosophical and historical grounds. The description of each domain is not the focus of this chapter, but the next chapter on the theoretical framework explains the domains in full. The next section discusses the kinds of knowledge that TVET lecturers gain through WIL from a global perspective.

2.4.1 Global context on kinds of knowledge gained by TVET lecturers during WIL

Schmidt (2019) carried out a study on vocational education teachers (VET) in Australia. The article examined the activities of vocational teachers' industry currency and its impact on their professional development. The paper used a multiple case study approach to understand the VET views on how they developed industry skills. Data were generated using semi-structured face-to-face interviews and analysed using thematic analysis. The cases were purposively selected using snowball sampling. The researcher for this article used the same method as my study except for snowball sampling. The results reported that VET teachers focused on developing pedagogical knowledge and skills (Schmidt 2019). In addition, reports showed that managers focused on ensuring that VET teachers gained the technological skills and knowledge (Schmidt 2019). Findings indicated that it was great to have industry currency that improved their experience. However, Schmidt (2019: 12) posits:

> Finding the balance between industry and educational currency and current teaching pedagogies is needed to ensure that teachers acquire the required skills to be effective VET teachers. Without appropriate pedagogically focused professional development, VET teachers risk seeing themselves as tradespersons rather than VET teachers.

Misko, Guthrie and Waters (2021: 28) contend:

> The challenge is getting the balance right, by building on that expertise while developing both the teaching skills and essential non-teaching capabilities and maintaining industry currency.

Therefore, the industry skills developed at the workplace would form PCK when TVET lecturers in my study work in different contexts over some time. VET teachers reported a challenge balancing their full-time workload with their industry currency since they were supposed to volunteer their industry placement time. Schmidt's study shows a gap where vocational teachers in Australia were not given official time-off to focus on industry currency. Research literature from another Australian study recommended providing study leave to academics to engage meaningfully with industry to gain current knowledge and improve their understanding of the practical aspects (O'Connell *et al.* 2015). My study, however, investigates TVET lecturers, whose work placement was arranged by a WIL officer, as confirmed by Smith (2017) and Swiss-South African Cooperation Initiative (2016a) that TVET lecturers received some time to complete their industry attachment. My study determines how the TVET lecturers attended WIL against their teaching function. Compared to my study, the conditions under which industry placement occurred differed since the article showed that VET teachers had to volunteer their time for industry placement.

Still in Australia, Smith and Yasukawa (2017) conducted another study on what made an excellent VET teacher. The significance of Smith and Yasukawa's study is that specialisation areas included the three areas of my focus. The specialisation areas included Plumbing, Electrical and Electronics, Carpentry, Information Technology and Auto and Body repair, while my study selected civil, electrical and mechanical engineering studies. The study drew from Shulman (2005) work on domains of knowledge and the practice architectures of VET teaching by Kemmis *et al.* (2012). Similar to my study, the findings from the article were thematically analysed from the emerging themes. Student participants presented the importance of in-depth subject knowledge, mainly when the lecturer includes personal anecdotes of their time in the industry and uses different methods to explain the same concept

(Smith and Yasukawa 2017). VET teachers were viewed to demystify and simplify the jargon, give examples of their recent work experiences in the business world and act with technical authority (Smith and Yasukawa 2017). In some way, Smith and Yasukawa's study is similar to my study as it sought to establish teacher knowledge. However, it remains to be discovered if TVET lecturers gained all these skills identified by Smith and Yasukawa (2017).

The literature summarises the benefits of a lecturer WIL placement to measure learnt experiences integral to different practice trades. WIL offers the opportunity to expand and explore theoretical ideas learnt during their academic studies in a practical, real-life situation (Abery, Drummond and Bevan 2015). To find out what the Health Science students learnt in their shift from educational to professional practice context, Abery, Drummond and Bevan (2015) carried out a qualitative investigation in Australia to understand what they want through WIL placement experience, engagement and reflection. A narrative in-depth qualitative research method allowed students to tell their experiences (Patton 2002). Twenty-two students completed an online survey, and from this data set, 19 participated in a face-to-face interview. Results showed that students felt appreciated in the workplace and took ownership of the work undertaken (Abery, Drummond and Bevan 2015). Paterson, Keevy and Boka (2017) agree that students on WIL perform activities that help frame the workplace experience and guide them towards acquiring insights into their identity and role as artisans. Further to that, students gained much more understanding of how industry workplaces operate; the significance of communication and felt more prepared for the workforce. Students much appreciated the WIL opportunity, as supported by a participant’s response:

> It bridges the gap between theory and practice. You can have all the theory in the world, but without the opportunity for practice, you are up the proverbial creek without a paddle (Abery, Drummond and Bevan 2015: 90).

To produce work-ready graduates, participants confirmed that industry exposure provided answers to the missing gap. Research confirms a huge gap between the linkage of classroom knowledge and practical work (Raskin 1994; Anjum 2020). However, very little is known about whether TVET lecturer WIL industry placements can meet their needs, prospects and future career objectives. Abery, Drummond and Bevan (2015) study sought to elicit student perceptions of placement expectations before, during and after the WIL experience by investigating the required resources to ensure a positive WIL experience. However, my study investigated skills gained by TVET lecturers during WIL.

Again, Robertson (2008) investigated VET teachers' knowledge and expertise in Australia. While the article provided an opportunity for participants to develop the knowledge bases needed for professional teachers, it also formed a reasonable basis for my study as it employed Shulman’s model, which is part of my conceptual framework. Robertson's study used a conceptual framework on PCK from Shulman (1987) and Turner-Bisset (1999), who built 12 knowledge bases constructed from Shulman. It was for these reasons above that I chose to discuss Robertson’s study. Data were generated from 18 TVET expert teachers who were purposively selected.

Similarly, my study used Shulman as a conceptual framework and chose participants purposively because lecturers on WIL were scarce. Findings showed that VET teachers gained technical knowledge, industry currency, teacher networks, teaching methodologies, and personal attributes (Robertson 2008). Further, it showed that students on work-based learning learnt the complex process of transferring building drawings into the construction site's reality (Fjellström 2014). The findings match with the findings of Smith and Yasukawa (2017) immediately above. Participants are reported to have developed general pedagogical knowledge, content knowledge, curriculum knowledge, and knowledge of educational contexts related to competency-based learning in their increasingly complex work environments. It implied that the VET teachers were exposed to making tough pedagogical and professional decisions consistent with their practical skills and needs. Robertson's study did not address the views of the industry. Hence, my research presented their opinions about the kinds of knowledge that TVET lecturers learning during WIL gained.

In Malaysia, Omar, Zahar and Rashid (2020) conducted a study on TVET teachers' knowledge, skills and attitudes as determinants of their competence. The study focused on TVET teachers' competence and the best traits to be explored during industry training. The areas of specialisation were Electric and Electronic Technology, Machining Industrial Technology, Welding Technology, Automotive Technology, Refrigeration and Air Conditioning Technology, Construction Technology, Computer Systems and Networks (Omar, Zahar and Rashid 2020), yet my study focused on electrical, civil and mechanical engineering programmes only. Therefore, this article covered all my target subject areas. A quantitative survey method generated data from 150 TVET teachers randomly selected from a population size of 247 teachers teaching vocational subjects listed immediately above. My study purposively selected 27 participants, while Omar, Zahar and Rashid (2020) covered 150 TVET teachers across a broader subject spectrum. My qualitative study employed face-to-face interviews and non-participant observation to generate data. To test the survey questions, instruments in both studies were piloted on TVET teachers who did not participate in the study.

Similarly, my interview schedule was piloted using conveniently selected 5 TVET lecturers who were not part of the study. The findings disclosed that all the TVET teachers could operate equipment in the workplace, gain the skills to apply safety practices in the workshop, and were competent with skills in their field of expertise (Omar, Zahar and Rashid 2020). Literature supports that students on a work-based learning programme in the construction industry in Sweden were involved in practical activities on cladding, building insulation, framing, repair and renovation, mounting windows, roofing, and aligning work to specific national regulations (Fjellström 2014). The results implied that the TVET teachers gained pedagogical knowledge and possessed knowledge in the subject matter. Omar, Zahar and Rashid (2020) further demonstrated that TVET teachers were knowledgeable in applying demonstration-teaching methods during a practical-based learning environment. A similar study conducted by Chua and Jamil (2012) in Malaysia showed that experiential and problem-based learning exposed the lecturers to new technology and refreshed TVET instructors in terms of their subject matter. The study further stated that TVET instructors who frequently used technology through practical training could master technological knowledge that improved classroom management. The study also found that the attachment program in industries helped TVET instructors acquire content knowledge, establish communication networks with colleagues, and learn from high-technology machines and technical equipment aligned with TPCK. Therefore, the teachers gained curriculum and pedagogical knowledge, which were determinants of their effectiveness in class. My study sought to find out what TVET lecturers learnt during WIL and how they learnt.

However, the study differed from mine because researchers did not get industry views regarding TVET lecturer experiences. My study includes the host companies for lecturers to hear what they say about the kinds of knowledge that TVET lecturers gained through practice during WIL.

Paryono (2015) conducted an extensive study on the Association of Southeast Asian Nations (ASEAN) member states. The study focused on preparing TVET teachers and instructors who lacked industry experience in the member states. The nine-member states (Brunei, Darussalam, Cambodia, Indonesia, Lao DPR, Malaysia, Myanmar, Singapore, Thailand, and Vietnam) reported that the TVET teachers were perceived to undergo practical, extensive hands-on experience in industries and received mentoring from experienced professionals. The approaches used were TPCK, competency-based curriculum, as well as problem-based learning. In all of the ASEAN countries above, TVET teachers reportedly needed hands-on industry practice, pedagogical knowledge and technical expertise to provide students with the appropriate skills and knowledge needed by industry (Paryono 2015). It appeared that the study aimed at ensuring that TVET teachers enhanced their pedagogical education skills through engagement with a real industry-working environment. Paryono's study reported on the preparation of TVET teachers to gain industry experience, content, curriculum, teaching and learning methods. However, my study shows what and how TVET lecturers learnt during WIL.

In Estonia, Timostsuk (2015) studied the domains of science PCK in student teachers' practice experiences. The study described how science PCK was reflected in the teaching and learning experience of future teachers. Qualitative data were generated using focus group interviews and a questionnaire and analysed using the domains of PCK as described by Schneider and Plasman (2011). Close to my sample size, Timostsk purposively selected 25 student teachers for the study and analysed data using the NVIVO7 programme to indicate prevailing tendencies in science student teachers' PCK. The software helps manage data efficiently, find themes and save time for data classification (Dollah, Abduh and Rosmaladewi 2017). Findings showed the development of scientific ideas, processes and sequences, assessment strategies and curriculum resources (Timostsuk 2015) in line with PCK described by Schneider and Plasman (2011). While Timostsk's study addressed the domains of science teacher knowledge, it differs from my research in the context under which the participants were exposed (industry vs school). My study deepens to discover the kinds of knowledge that TVET lecturers gained during WIL.

Using the model by Shulman (1987), which was further developed by Grossman (1990) PCK model, Nogueira and Moreira (2012) conducted a study on vocational teachers in Portugal with a focus to understand the practices, conceptions and settings linked to the teaching and learning practices of Civic Education. The study used a literature review of previous research documents to generate Civic Education teachers' conceptions and practices. In contrast, my research was qualitative and generated data through interviews and non-participant observations. Grossman (1990) model on teachers' knowledge and Shulman (1987) model on PCK were used as the framework for Civic Education teachers' knowledge. I used Kolb (1984) ELT, which I complemented with a conceptual framework on teacher knowledge by Grossman (1990) and Shulman (1987). Several authors concurred that knowledge dimensions occurred in a constructive process based on reflection on and in practice.

The findings revealed that curriculum knowledge was regarded as necessary because the Civic teachers were expected to integrate different knowledge domains in their activities (Nogueira and Moreira 2012). The Civic teachers were viewed to need knowledge of instructional strategies and a pedagogical approach suited to the subject matter to transform knowledge of particular content or topics and elucidate subject matter in new ways (Nogueira and Moreira 2012). In Belgium, Iserbyt, Ward and Li (2017) investigated the effects of improved content knowledge on pedagogical content knowledge (PCK) and the performance of physical education students and showed that the teacher’s PCK was essentially different before and after the experiment. The study demonstrated that improved specialised content knowledge changed PCK and student performance on how tasks and other responsibilities were presented and the suitability of the tasks chosen for student performance. Although this study did not investigate WIL in industry, it studied practices and contexts related to the teaching and learning process, which raised teachers' knowledge through practice in teaching Civic Education. Therefore, my study confirms if TVET lecturers learning through WIL gained the domains of teacher knowledge through their industry practice.

Tse (2010) conducted a study in Hong Kong, China, to determine what skills hospitality students gained during a 10-week to 48-week WIL placement. The placement was a compulsory work-integrated education (WIE) module of their curriculum. WIE is an industry-based, on-the-job practical learning exposure implemented in appropriate operational areas within the hospitality industry. The qualitative research indicated that the placements helped hospitality students learn practical skills through dealing with customers, using software and experiencing work procedures (Tse 2010). They also learnt from colleagues and built relationships with them, and acquired supervisory and managerial skills through practice and observation. This finding gels with (Morris 2020), who reported that students learnt from others, thinking of solutions through effective dialogue. Nevertheless, my participants would have two years in the industry, focusing on lecturers learning through WIL. My study establishes the nature of learning, and how the lecturers understand their learning, including the kinds of knowledge.

The literature from a global context on the kinds of knowledge gained by TVET lecturers learning during WIL is summarised next. The literature presented above were from countries like Australia, Malaysia, Portugal, Hong Kong and the 9 ASEAN member countries. Participants included TVET teachers and instructors, and students. Qualitative, quantitative and mixed methods approaches were noted in the presented articles. The methods of data generating included semi-structured interviews, focus group interviews and online surveys. Thematic data analysis, SPSS, NVIVO, ANOVA, and content analysis followed these data generating methods. Australia showed that VET teachers had to make their own time for WIL. Generally, there was consensus that WIL benefited participants in gaining skills. My study seeks to establish the nature of TVET lecturer learning, which they gained during WIL and determine how they understood their learning. The next section discusses the regional context on the kinds of knowledge that TVET lecturers gain during WIL.

2.4.2 Regional context on kinds of knowledge gained by TVET lecturers during WIL

The regional context includes developing countries in Africa like Kenya, Zambia, Ghana and Nigeria. All the studies focused on WIL for lecturers and students and participants included lecturers, students and industry personnel. The use of a questionnaire was predominant among the five studies. The analysis of each study visited unfolds below.

Muchemi *et al.* (2013) studied industrial attachment's influence on instructors' and students' competence in Kenya's industrial processes. Lecturers gained practical knowledge, which helped them to improve their content knowledge. The findings generated from questionnaires and semi-structured interviews reported that industrial attachment provided them with chances for using the most current technology, machinery, equipment, tools and systems, therefore contributing to product knowledge which is vital for making concepts accessible during delivery (Muchemi *et al.* 2013). Additionally, participants gained innovative ideas in establishing links with industrial and socio-partners (Muchemi *et al.* 2013). They also gained the power to relate teaching and learning processes to the latest industry developments. My study establishes whether TVET lecturers on this WIL initiative also gain these skills. The study is relevant because it investigated what teaching staff benefited from industrial attachment and activities carried out. My study seeks to establish what TVET lecturers learn through WIL, how they learn and how they understand their learning.

Mukhale and Hong (2017) conducted another study in Kenya exploring lecturers' professional development needs and suggested improving their pedagogical knowledge and skills. A descriptive qualitative approach was used, with 15 university lecturers randomly selected to participate in the study. A semi-structured, face-to-face interview was employed to generate data and analysed using thematic coding. In comparison, my study used semi-structured interviews from purposively selected TVET lecturers. The interviews were complemented by non-participant observation for triangulation. The findings indicated that the long and continuous training programmes with numerous opportunities to experiment and reflect helped produce better results (Mukhale and Hong 2017). The participant from the Agriculture department confessed:

> I have difficulties in delivering the content since I have limited knowledge in my area of specialisation. The workshop should highlight the best-bet animal technologies (breeding, feeds and feed manufacturing industry) that livestock farmers can adopt to improve livestock performance for better livelihoods (Mukhale and Hong 2017: 154-155).

The excerpt shows a lack of appropriate practical knowledge on the lecturer's part. This vignette could refer to the theory-practice relationship that my study sought to establish when the TVET lecturers attended in-depth practical learning of the subject. My study establishes if lecturers gained content knowledge, which they would amalgamate to have PCK.

Mulenga and Chileshe (2020) studied the appropriateness and adequacy of teaching and learning resources and students' industrial attachment in public TVET colleges in Zambia. Six TVET College principals were purposively selected, while stratified and simple random sampling was used to sample sixty lecturers. Within this research design, Mulenga and Chileshe (2020) used a qualitative approach to generate in-depth data from Technical Education, Vocational and Entrepreneurship Training Authority (TEVETA) officials from college principals. In contrast, my quantitative approach facilitated the generating of data from TVET lecturers. Findings showed that TVET institutions had many challenges ranging from lack of appropriate and modern workshop equipment to ineffective industrial attachment (Mulenga and Chileshe 2020). My study was limited to investigating what and how TVET lecturers learnt during WIL. Whether TVET lecturers were provided with a conducive industry WIL learning environment to acquire the required technical competencies was out of the scope of my study. Further research could focus on that area.

In Nigeria, Ugwoke *et al.* (2016) explored WIL implementation by Nigerian universities in partnership with industries. A descriptive survey method was used for the study. A structured questionnaire was used to generate data from 117 TVET lecturers in universities that offered TVET courses in Nigeria. The questionnaire was structured on a five-point Likert scale. A structured questionnaire shows that responses were restricted to predetermined answers, limiting participants who wanted to say more. In contrast, my study chose a semi-structured face-to-face interview to capture verbal and non-verbal actions and emotions. The study results indicated that WIL was implemented to a low extent by the universities, and the implementation was restricted by many factors like low teacher quality, lack of policy and curriculum provisions for WIL experiences (Ugwoke *et al.* 2016).

The findings highlighted that students were placed in industries with required facilities, mentored and supervised in the workplace by trained personnel (Ugwoke *et al.* 2016). Furthermore, students and the TVET institutions followed policies and procedures where effective communication existed between the TVET institutions and employers during the WIL programme (Ugwoke *et al.* 2016). Whether the TVET received support from various stakeholders during WIL in industries is unknown. Further to that, my study determined what TVET lecturers gained during WIL.

The recent developments from an industrial economy to a knowledge-based economy show a shift in industry demands in terms of skills required in the 4IR. Inti, Latib and Saud (2016) explored the common skills required by Mechanical Engineering National Diploma students at polytechnic institutions in Nigeria as perceived by industrial workers and lecturers towards the broad skills required in terms of the priority levels. The study used the quantitative method: a survey was utilised to explore industrial workers and polytechnic lecturers' perceptions. Using a stratified random sampling method, a study sample of 302 industrial workers and 234 polytechnic lecturers was selected.

The data were generated using a structured questionnaire, which three experts from the TVET field validated. The instrument was pilot tested using 45 participants. The data were analysed using descriptive and inferential analysis as compared to thematic analysis, which I used. The findings indicated that all the eight clusters of generic skills: oral and written communications; problem-solving and critical thinking; initiatives and enterprising; ICT skills; interpersonal and teamwork; resources management; and personal qualities were considered essential for prospective diploma graduates Inti, Latib and Saud (2016). The finding aligns with Davis (2010), who found that good oral communication enhanced productivity in the 21st-century engineering workplace environment. Further, Pusiran *et al.* (2020) stressed that interns should be equipped with technical expertise in their disciplines, communication skills, problem-solving skills, adapt to different settings and function effectively. The findings showed no disparity in the perceptions of two groups of respondents on generic skills regarding their workplace priority. There was no significant difference between industry workers and polytechnic lecturers' perceptions of the students' generic skills. The views of TVET lecturers and industry personnel in my study are unknown, and whether their views about WIL are similar.

In Ghana, a proposal was made that all TVET students engage in an industrial placement to practice what they studied in the lecture rooms. Anane (2013) examined the Competency-Based Training (CBT) concept as a delivery method in skills development and highlighted some challenges of implementing CBT in Ghana. The CBT programme provided opportunities for the CBT learner to develop planning, organisational, interpersonal and problem-solving skills, self-awareness and technical competencies through practical work experience in real work situations with a limited degree of facilitator support (Anane 2013) and described as an industry and demand-driven training programme based on well-defined industry-generated standards. In other words, the industry standards are the basis on which the CBT program, assessment and learning materials are developed. The study purposively selected 149 CBT graduates from the three courses on offer: Certificate 1 in Electronics; Certificate 2 in Welding; and a higher national diploma in Plant Engineering. Norton (1987: 4-5) presents five key characteristics of CBT programmes that were used to analyse CBT Programmes. The five essential competencies are:

- Competencies to be attained are carefully identified, verified and publicised in advance,

- Criteria to be used in evaluating achievement and settings under which achievement is assessed are specified and publicised in advance,
- The instructional program provides for the development and evaluation of each specified competency,
- Competency assessment takes into account the participant's knowledge and attitudes but involves the actual performance of the competency as the main evidence source and,
- Participants advance through the instructional program at their rate by indicating the specified competencies' attainment (Norton 1987: 4-5).

Although results showed that the industrial attachment placement process was a challenge due to the limited industries available, those placed in the industry had to undergo supervised practical training and gained practical experience relevant to their skills. However, it was highlighted that participants achieved competencies required in their jobs' performance and built confidence as they mastered specific competencies in their trades. A follow up done on the CBT graduates disclosed that they achieved a 100 % employment rate, which suggested that their skills through attachment helped create job opportunities. The main difference with my study lies in participants and the theory used to analyse the findings.

The studies cited in the preceding segment focused on WIL for lecturers and students. The participants were lecturers, students and industry personnel. Findings showed that students gained practical experiences relevant to the skills they had learnt in college. In Nigeria, students gained generic skills during WIL. Findings in Kenya reported that industrial attachment provided them with opportunities for working with current technology, equipment, machinery, tools and other engineering systems. Other findings reflected a lack of appropriate and modern workshop equipment and ineffective industrial attachment programmes. My study advises what and how TVET lecturers learnt during WIL and determines if they understood their learning. The next section discusses the kinds of knowledge that TVET lecturers gain through WIL in a South African context.

2.4.3 South African context on kinds of knowledge gained by TVET lecturers during WIL

Oosthuizen and van der Bijl (2019) studied how TVET lecturers maintained industry skills and knowledge in South Africa. The study involved Hospitality, Tourism and Business Management TVET lecturers, while my study focused on civil, electrical and mechanical TVET lecturers. Two hundred and forty-nine TVET lecturers from 18 TVET colleges volunteered the completion of a close-ended questionnaire. The research used a quantitative method and a post-positivist paradigm. The research design was embedded in the theory of reflection (Martin and Hughes 2011), while in my study, reflection is also rooted in Kolb's theory. Data were analysed using SPSS statistical analysis, and it was tested for internal reliability using Cronbach's alpha coefficient, while my study uses thematic data analysis. Findings disclosed that Hospitality lecturers gained subject knowledge from work while Tourism lecturers drew their initial subject knowledge from work (Oosthuizen and van der Bijl 2019). The Hospitality lecturers confirmed keeping their subject knowledge updated through WIL and maintaining the hospitality course's hands-on nature (Oosthuizen and van der Bijl 2019). A Malaysian study confirmed that internships developed many skills through hands-on industry practical experience (Pusiran *et al.* 2020). Even though the participants' courses differed, my study established whether TVET lecturers learning during WIL gained subject knowledge in their areas of specialisation. The participants in both studies were all TVET college lecturers, even though their areas of specialisation differed.

Zinn, Raisch and Reimann (2019) explored TVET lecturers in South African public colleges and the necessity for further profession-oriented training. The results were analysed based on Ochs and Phillips (2002) model regarding policy transfers. It was disclosed that there was a willingness to put into practice reforms to continue developing TVET education and lecturer training. The results showed that one in five TVET lecturers in South Africa could not satisfy the minimum requirements for basic TVET lecturer qualifications. Lecturers identified the education management system as widely unsupportive, ineffective and discriminatory because of the mentorship programme and further training opportunities, which were not clearly defined. Exploring the link between mentoring and WIL, (Smith-Ruig 2014) discovered that mentoring yielded career-related benefits, which increased career understanding, confidence, knowledge, and appreciation of the workplace realities.

Mentoring is one such form of social learning and is a means to provide WIL for the student. In this study, mentoring entailed career-related support, which helped TVET lecturers to build relationships, identify themselves within the host company and learn from certain behaviour, values and attitudes shown by industry personnel (Levesque *et al.* 2005). While a high variation of TVET lecturer qualifications was noted, lecturers' training was recommended to deliver knowledge for the practical educational advancement of lecturer training. The case study participants realised a need for improvement in the content knowledge area of competencies such as new technologies, control engineering, electronics, information technology and CNC. Karunaratne and Perera (2019) indicate that students perceived that industrial internship offered specialised training. One in every ten participants identified a further development need in the pedagogical content knowledge and pedagogic-psychological knowledge (Zinn, Raisch and Reimann 2019).

A dual system of integrating theory and practice could be established by implementing a WIL embracing curriculum. In striving to demonstrate how WIL prepared National Certificate Vocational (NCV) students for industry, Mabunda (2019) conducted a TVET College study in Gauteng province, South Africa, to establish how WIL prepared NCV students for the industry. The results showed that many college learners exited the NCV course lacking either practical experience or industry exposure. It emerged that lecturers were not enthusiastic about WIL and saw it as the college management and WIL facilitators' obligation. Current literature highlights the technical hitches experienced in WIL implementation and the lack of proper implementation models, possibly supporting why WIL students are not well prepared (Jackson 2015; Taylor 2017; Van der Bijl 2021). Mutereko and Wedekind (2017) and Blom (2014) also highlight that work placements are unstructured because they do not contribute to the qualification outcome. In this light, Barends and Nel (2017) stress that the implementation of lecturer WIL requires all stakeholders to reconsider every aspect of WIL to ensure adequate capacity building. Therefore, stakeholders need to work together and propose a well-structured WIL programme.

Most TVET graduates are considered not employable (Sephokgole and Makgato 2019) because most industries regard them as not occupationally competent. Sephokgole and Makgato (2019) investigated 194 NCV students' perceptions of WIL in Limpopo province, South Africa. A quantitative research approach was applied in the study through a one-hour questionnaire administered to students at four campuses. Face validity was used to validate the research questionnaire. The analysis was grounded on the percentage result of students' responses to each questionnaire item. Percentages used without frequencies can be misleading (Hoffrage *et al.* 2000). Therefore, my analysis included actual numbers to avoid misleading figures. The findings showed that the participants negatively perceived classroom assessment fairness because they could not apply their learning to real-life situations. A high percentage of students disagreed that WIL developed students' work-related skills (Sephokgole and Makgato 2019). Although some literature generally points out WIL as a useful tool and an important programme to prepare students for the workplace, the results showed that most students perceived WIL as less important because they could not use the knowledge and skills they learnt to find jobs on the labour market. Their opinion could have been informed by the high unemployment challenges in the country and not because WIL was not helpful. After all, they were unable to integrate theory with practice. My study established what and how TVET lecturers learnt in the industry during WIL.

Du Plessis (2010) conducted a study on the current model of teaching practice in South Africa. Teaching practice is a form of WIL (Du Plessis 2010). It implies that teaching practice could be similar to lecturer WIL since they put into practice the theoretical content learnt in college, similar to WIL lecturers who had industrial exposure in companies. The constructivist theory on teaching and learning by Piaget (1955), Dewey (1966) and Vygotsky (1978) were used as the theoretical frameworks, while my study uses Kolb's ELT, which is deeply rooted in the theories mentioned above. The study investigated B.Ed. students' teaching practice while I explored permanently employed lecturers learning through WIL in industry. Findings indicated that the students learnt pedagogical knowledge and aligned their study material and syllabus to National Curriculum Statements documents. This study established whether lecturers gained practical knowledge. The following section concludes the reviewed literature on the kinds of knowledge that TVET lecturers gained during WIL.

The literature that was reviewed on the kinds of knowledge that TVET lecturers gained during WIL involved students and TVET lecturers. The literature focused on their learning in different industries and contexts. Ten studies looked at the industrial attachment for TVET lecturers, while two studies investigated students on industry WIL and two others explored students on teaching practice. These studies highlighted that TVET teachers gained technical knowledge and industry currency to operate equipment, tools and systems in the workplace, expertise in teaching methodologies and established communication networks. Furthermore, the value of in-depth subject knowledge was reinforced when the lecturer includes personal anecdotes of their time in the industry and different ways of explaining the same concept, demystifying and simplifying jargon. I also learnt that TVET lecturers developed pedagogical knowledge, content knowledge, curriculum knowledge, and knowledge of educational contexts related to competency-based learning in their increasingly complex work environments. They acquired knowledge which would assist them in the classroom. The next section discusses conceptions/perceptions of TVET lecturers' learning through WIL.

2.5 CONCEPTIONS OF TVET LECTURERS' LEARNING THROUGH WIL

WIL is generally explained as a programme meant to show how theoretical principles are translated into practice. This study's perceptions represented what TVET lecturers understood about learning during WIL, which may involve acquiring, storage, reproducing and usage of knowledge to have a deep understanding of learning. The conceptions of different learning environments are described in terms of different conditions and approaches to learning. My study attempts to clarify the meaning of the various conceptions that emerge, highlight the interrelationships between them, and consider how they may affect participant reactions to the learning environments they experience. The conceptions of previous research are given from the global, regional and South African context. The global perspective is explained first.

2.5.1 Global context on conceptions of TVET lecturers' learning through WIL

In this section of the study, I discuss conceptions of TVET lecturers' learning through WIL from a global context. The literature was mainly from Malaysia and Australia because there are many research papers on the topic. Other sources were Brazil, New Zealand and Papua New Guinea. Each source is analysed and compared with my study. Due to scanty literature directly relating to TVET lecturer learning during WIL, the literature reviewed also included students from TVET colleges and universities.

A study was conducted by Bergami and Schuller (2009) on perceptions of industry placements of business studies academics in Australia. The study explored the conceptions of industry placements of business studies academics. Bergami and Schuller (2009) used their theoretical model for teacher placement in the industry, which I also applied in my study to complement Kolb's ELT. A questionnaire was used on 225 academics, where only 54 questionnaires were returned. I used purposive sampling and included all lecturers on WIL from the selected colleges. Twenty-one participants (40%) showed an interest in pursuing an industry placement, and the rest expressed no interest. The reason for lack of interest to pursue an industry placement was prior industry experience and current employment in the industry.

Furthermore, some participants could not pursue an industry placement opportunity because they were only employed on a contractual basis where the conditions were not conducive to training and development opportunities. It was reported that an overwhelming majority of participants showed that they were not aware of the placement conditions. Emanating from their research, Bergami and Schuller reported that academics conceived WIL as necessary for expanding their knowledge since they gained professional development, up-to-date industry practices, career growth, linking theory to practice and developing networks and professional contacts. Conversely, some academics showed a lack of interest to pursue an industry placement because of prior industry experience and their current employment in the industry. My study aims to establish the lecturers' conceptions of their learning through WIL, given that these lecturers do not have prior industry experience. Implicit in the responses noted immediately above is a desire for enhancing teaching and learning practices. My study establishes what the TVET lecturers on WIL conceived about learning through industry attachment.

In support of the discussion above, another study in Australia (Kemmis *et al.* 2012) investigated VET teachers' conceptions of their pedagogy in terms of their sayings (cognitive: perspectives and understandings of work in the workplace); doings (psychomotor skills like operating a machine in the workplace) and relatings (how they relate to workmates in the workplace) in their practice architectures as explained in theory by Lave and Wenger (1991). The study was qualitative to access the perceptions of participants. A constructivist theory by Vygotsky (1978) and Engeström (2007) on the zone of proximal development was used to provide insights into participants' perceptions. My study used Kolb's ELT and a conceptual framework to unpack the findings. Interviews and field observations were used to get a richer and more in-depth understanding of the 14 VET teachers' realities from Technical and Further Education (TAFE) and 12 former trades and industry participants. The significance of the study was that the participants were similar since my study focused on TVET lecturers and industry personnel. The VET teachers were specialists in Design, Hospitality, Construction, Agriculture, Metals and Engineering and Information Technology.

In contrast, this study focused only on Civil, Electrical and Mechanical engineering fields. Results showed that when VET teachers moved from one set of practice architecture into new situations their practices were enabled or constrained. The teachers reported gaining self-esteem, confidence and pedagogical skills like communicating and establishing good relationships and viewed their pedagogy as praxis (Kemmis *et al.* 2012). The teachers further said that they gained significant work experience, a sense of worth, and pedagogies to bring knowledge from the workplace to the classroom (Kemmis *et al.* 2012). Even though the setup and fields of study were different, my study explored if TVET lecturers learning during WIL experienced similar industry encounters.

From Australia to neighbouring New Zealand, Martin and Rees (2018) explored the value of WIL with a focus on sports management and coaching student insights on WIL and their development of professional attributes. In contrast, my study focused on civil, electrical and mechanical engineering TVET lecturers. Kolb (1984) ELT was used for the study, which was similar to my study. Data generated from 271 participants was analysed using NVIVO11 software and a thematic content analysis model by Braun and Clarke (2006) to search for common themes. Although I used thematic analysis in my study, I did not use any software for data analysis because I was taught to apply thematic analysis. The findings showed that students developed self-management, effective communication, soft skills and a community of practice. Students perceived that a successful practicum placement could significantly influence current, relevant, and useful skills and build confidence. The academic supervisor's findings generated great support throughout the practicum experience, which formed good relationships and industry networks. Scholars emphasise the importance of building contact networks during WIL to maximise career and skills development (Martin and Hughes 2011; Fleming and Haigh 2017). It remains to be clarified if TVET lecturers learning during WIL developed the same perceptions about their learning.

In a study conducted in Papua New Guinea, Subbiah *et al.* (2017) explored undergraduate students' perceptions of industrial training. The study aimed to examine students' perceptions of the relevance of industry training skills during attachment. A total of 108 Tourism and Hospitality students participated in the survey by completing a quasi-structured questionnaire on industrial training. Students perceived that industry training provided an opportunity for the following:

- to gain practical experience in an industrial setting;

- to link theoretical knowledge, practical experience, and confidence in future job opportunities.
- What could be a suitable model for TVET lecturer WIL implementation?

The majority (61%) of participants indicated that they had no problems during their industrial placement. In comparison, 20% experienced difficulties and reported that the industry personnel did not cooperate with them during their industry exposure (Subbiah *et al.* 2017). To eliminate doubt among industry personnel during TVET lecturer WIL, a model for TVET lecturer WIL implementation is proposed in this study. The model aims to clarify the path followed by lecturers during industry training. Also, Subbiah *et al.* (2017: 74) reported: "Mainly the workmen with the lack of formal education thought that the trainees would replace them right after completing their study." Findings noted that the supervisor was not helpful, and there was a lack of knowledge to use the accounting software (Subbiah *et al.* 2017). Both studies focused on learning through WIL in industry, although my study focused on TVET lecturers learning during WIL. Whether TVET lecturers gained skills or faced resistance from industry personnel is yet to be discovered.

Rosly *et al.* (2019) studied the TVET lecturer and industrial training through National Occupational Standard Skills (NOSS) in Malaysia. The study showed reflective thinking on the NOSS for the engineering and technology TVET lecturers across Malaysia. The research used multiple methods to generate data, such as focus group interviews, government reports, journals and conference proceedings. Workshops were conducted to identify the main competency of TVET lecturers. Further to that, interviews were also conducted with 21 TVET practitioners from different institutions. My study generated data using a semi-structured interview and non-participant observation and analysed it thematically, while the article data were analysed through content analysis. The results showed that TVET lecturers needed to be independent and collaborate with industries during work-based learning programs. A study by Karunaratne and Perera (2019) agrees that participants conceived that there was no proper training schedule, and they needed more chances to apply theoretical learning into industry activities and get the freedom to work independently. Findings exposed that TVET lecturers' industry training was perceived to provide hands-on experience, practical and industry-based learning (Rosly *et al.* 2019). Industry training was further perceived to enhance collaboration between industry and TVET lecturers and transform the curriculum to match industry skills (Rosly *et al.* 2019). Scholars emphasised the need for hands-on experience during industry experience to give the correct feel of real activities (Paryono 2015; Oosthuizen and van der Bijl 2019; Van der Bijl and Oosthuizen 2019; Pusiran *et al.* 2020). Since my study focused on TVET lecturers learning during WIL, it disclosed whether WIL provided hands-on practical experience and TVET lecturer linkages with industry.

In confirmation of the above are findings from Bergami, Schuller and Cheok (2011), who studied academics' perceptions of Malaysia's industry placements. The study sought industry placement benefits for the stakeholders (academics, educational institutions, host industry and students). A sample size of 27 academics was used for the study. The sample size was similar to my study but differed on the participants as I included 18 TVET lecturers and nine industry personnel. The study used Lave and Wenger (1991) theoretical model and industry placement relationships model by Bergami and Schuller (2009) to interrogate the findings. My study also employed Bergami and Schuller (2009) model on teacher industry placement, and it remained to be tested if the findings matched the stages of the model, as was the case with the findings from the article. The findings were analysed using descriptive statistics. Findings showed that 24 out of 26 participants showed a lack of institutional support for industry placement. Australian studies by (Billett 2013); Jackson (2015) showed a lack of employer support for WIL due to administrative and supervisory concerns, as well as a lack of buy-in from company management (Jackson 2016, 2018). The academics further perceived receiving industry knowledge and understanding and confirmed that the knowledge enhanced teaching and learning by linking theory to practice. My study investigated the nature of TVET lecturer learning during WIL to see what and how they learnt.

Another account of a study in Malaysia was conducted by Jainudin *et al.* (2015), who investigated civil engineering students' industrial training to check their exposure to the workplace's knowledge and skills. Convenience sampling was employed to select a total of 87 students from semesters 4 and 5. The students were interviewed using a structured questionnaire. The study disclosed that students had very high attendance and reasonable cooperation with the industry personnel. Industry personnel perceived that students complied because good attendance, punctuality and cooperation contributed to their course pass marks (Jainudin *et al.* 2015). As such, WIL lecturers often write a trade test after completing a recommended industry placement period. The study's findings also highlighted that students were aware of the importance of safety requirements at the construction site, such as PPE. What TVET lecturers learnt through WIL is yet to be seen. The difference was that students were attached for eight weeks compared to my study, where TVET lecturers learning through induction and mentoring: A work-integrated learning experience were attached for two years. The real performance of the students could have been different in a more extended period. Literature suggests increasing the internship period to 12 months or more instead of 6 months (Karunaratne and Perera 2019). It is yet to be discovered if lecturers benefited from skills during their 2-year industry placement.

da Silva and Teixeira (2013) investigated internship experiences of civil engineering college students in Brazil. The study explored students' perceptions of how internship experiences contributed to career development and transition from a student to a professional through experience. The participants were similar to the Jainudin *et al.* (2015) study immediately above. The qualitative study investigated six civil engineering students who were individually interviewed using a semi-structured interview schedule. Content analysis was used to analyse data. Results showed that students developed a status change on how they perceived themselves referent to becoming an engineer, which added more responsibility and seriousness (da Silva and Teixeira 2013). They regarded internships as making contacts with different people, working with different things and putting into practice the knowledge gained in college. Through the internship experience, students were perceived to discover their real interests and changed their vocational preferences after realising that they had taken an interest in careers they did not like. "The environment is outside work … it does not look like work … it is kind of weird… (da Silva and Teixeira 2013: 4). It implied that the students seemingly lacked understanding of a civil engineer's practical functions, thinking it was an office-based job. It also implied that they lacked career guidance on specific career choices and functions thereof. Lecturers on WIL have already taken choices and are gainfully employed, whereas students are still finding their ground. The other difference was that students attended an internship to fulfil their course requirements, pass their studies and gain employment, while lecturers gained knowledge for classroom delivery. The literature on lecturer conceptions is summarised next.

Different conceptions emerged from the findings above. Lecturers were convinced that industry training provided hands-on experience and practical and industry-based learning, focusing on linking theory to practice. Others conceived WIL as necessary for expanding their knowledge since they gained professional development, up-to-date industry practices, career growth and developing networks and professional contacts. Studies from students showed similar results that they knew the importance of safety requirements at the construction site, such as PPE. However, students' attachment period was short compared to lecturers, and students exhibited good attendance, punctuality and cooperation because they contributed to their course pass mark. Conceptions from the regional context are discussed in detail in the next sections.

2.5.2 Regional context on conceptions of TVET lecturers' learning through WIL

Industrial attachment (WIL) has increasingly become a common phenomenon in seeking practical industry experience and seeing how theoretical college work could be applied in the industry. Findings from employers confirmed that even TVET college students had theoretical knowledge in their field of expertise but lacked work exposure and job-specific skills (Papier 2017). Often, participants in WIL are assumed to acquire valuable professional experience during attachment. Most African countries have documented a huge gap between the demand and supply of skilled labour (United Nations Educational Scientific and Cultural Organisation 2013). Thus, the skills gap could be overcome by having an effective industrial attachment in reputable and advanced industries with the latest technology. From a regional perspective, the following research literature shows the conceptions of TVET lecturers' learning through WIL.

Akudugu and Obeng (2015) studied the conceptions of Agricultural Engineering lecturers in Ghana about the effectiveness of the competency-based training programme for lecturers in the industry. The study used a descriptive survey to generate data from lecturers who took part in students' supervision on industrial attachment. Ten lecturers were purposively selected from eighteen lecturers. Descriptive statistics were used in the form of frequency counts and percentages to analyse the findings. All lecturers evaluated the competency-based training programme as useful. Lecturers further conceived that WIL would help to improve the standard of teaching. To that effect, the literature indicates that industry attachment played a significant role in students' academic achievement since they acquired necessary skills, which enhanced their workshop practical skills after their exposure (Chukwuedo 2011).

All lecturers acknowledged having had adequate training in the competency-based training programme (Chukwuedo 2011). Lecturers further conceived that WIL would help improve the standard of teaching and learning. It is unknown if WIL improved the standard of teaching and learning in TVET colleges. The similarities are that both studies focus on lecturers learning during WIL and the participants intended to gain knowledge from WIL. My study determined if the TVET lecturers on WIL conceived as established by Akudugu and Obeng. This study investigated students on WIL while I explored TVET lecturers. The similarities are that both studies focused on learning through WIL while their participants differed. Both participants intended to gain knowledge from WIL. However, little is known about how TVET lecturers acquired skills in their different areas of expertise.

In Kenya, Odiwuor (2010) investigated lecturers' perceptions of TVET institutions and supervisors in the automobile industry towards their performance. The purpose of the study was to determine the extent of the gap between the capability of technicians produced by TVET colleges and their workplace performance. The study was carried out in all national polytechnics, two technical training institutes, two established garages and two *jua kali* areas (Odiwuor 2010). In Kenya, *jua kali* refers to the informal sector comprising artisans and informal traders who work on the roadside in the sun and make anything on demand (Kinyua 2013). Participant selection was through systematic, random, purposive and stratified sampling methods, while data were generated through questionnaires, interviews and direct observation. The statistical data analysis tools used were chi-square and ANOVA. SPSS was used to confirm the findings. The qualitative data analysis was done using open coding techniques. The study established that TVET lecturers and Automobile Industry supervisors were dissatisfied with the technicians' performance and that a relationship existed between what the technicians learn and the prerequisites in the automobile industry (Odiwuor 2010). Lecturers and trainees had the same dissatisfaction concerning tools, equipment and material for learning the automotive engineering course, whose standard was far below the changing technological advancements (Odiwuor 2010). The state in which TVET lecturers find at the host companies is uncovered in this study.

Lastly, in this section, Mhizha and Mandebvu (2012) sought to establish stakeholders' perceptions on the significance of workplace-based training for university students studying tourism and hospitality management at the University of Zimbabwe. The researchers adopted exploratory research, which generated data in a structured and unstructured manner from students, lecturers and industry representatives. Convenience sampling was used to select research participants. A survey research design was used with a questionnaire used to generate primary data from the selected respondents. Data were generated on the views of students, lecturers and managers in the industry. The findings reported that all stakeholders found the programme valuable and important where students acquired valuable professional experience during attachment (Mhizha and Mandebvu 2012). Some participants reported that the theoretical training received at the university blended well with industry practical work, while others thought that theoretical training received at college was not compatible with industry expectations Mhizha and Mandebvu (2012). The finding aligns with what I noted in the TVET sector, as a current TVET lecturer, where syllabi are dated compared to current skills needs.

Some students perceived that more time allocated to industry placement would intensify their skills and concretise their learning. WIL was found to be important where students acquired valuable professional experience during attachment. Akudugu and Obeng (2015) discovered that lecturers conceived WIL to improve the standard of teaching. The lecturer conceptions about WIL are generated through my study. The next section discusses conceptions of TVET lecturers' learning through WIL within a South African context.

2.5.3 South African context on conceptions of TVET lecturers' learning through WIL

As WIL programmes are becoming popular with TVET colleges, students, government, employers, and universities in South Africa, Ngwane (2016) conducted a study to investigate students' conceptions on the effectiveness of Bachelor of Technology WIL. The perceptions of 70 students studying a B-Tech programme were measured using a questionnaire to extract information about their experiential learning. Dickfos (2019) explains experiential learning as a WIL programme where participants obtain first-hand experience from the conventional classroom environment. Participant selection was through convenience sampling. The findings showed that many students acknowledged the importance of WIL in creating common learning spaces to support reflection and dialogue so that students can consider their experiences in the light of their peers' experiences (Ngwane 2016). Other students conceived WIL as offering a reasonable balance between theory and practice, which focused on gaining industrial experience rather than serving the need of a specific company (Ngwane 2016). The findings match TVET lecturer WIL placement in industry in that skills and concepts are reinforced, professional practice is enhanced, and skills such as teamwork, communication, self-management, problem-solving and understanding the world of work are gained. Literature supports that skills like meta-cognitive skills, teamwork, communication and self-management were gained through WIL (Jackson 2018). The skills align with the soft skills (Ellis, Kisling and Hackworth 2014), which employers considered as significant attributes. Lecturer WIL in this study is subject-specific, and the lecturers could be attached to companies in line with their field of expertise. Therefore, my study explores the nature of learning and the kinds of knowledge gained by TVET lecturers and establishes their WIL conceptions.

Sewell, Venter and Mason (2015) researched WIL in the South African retail Small, Medium and Micro Enterprises (SMME). The study explored the current WIL practices in South African retail vocational education and workplace skills development. A mixed methodology approach was used in the study, where a questionnaire and interview were employed. A questionnaire was conducted on a convenience sample of 75 retail students, while interviews were conducted on 20 retail SMME managers and 18 retail education staff. Sewell, Venter and Mason (2015) showed that stakeholders perceived that SMME did not have adequate time to coach or mentor students effectively. There was consensus that WIL was valued in terms of practical skills development and exposure. Some SMME managers (67%) vented their unwillingness to host students for WIL, citing challenges of time for SMME workplace and quality assurance of learning (Sewell, Venter and Mason 2015). The findings align with Chukwuedo (2011) in Benin, who found that students perceived that more time allocated to industry placement would intensify their skills and concretise their learning from their experience. In contrast, a study conducted by Agwa-Ejon and Pradhan (2017) in Germany, reported that WIL students were all employed and remunerated by the companies throughout their practical exposure period. All the students surveyed by Sewell, Venter and Mason (2015) viewed that workplace experience improved their skills and preferred WIL in a large and reputable business. Even though my study focused on TVET lecturers, the training part remains the same where they fall under a mentor in the industry for practical exposure. However, it remains to be explored whether TVET lecturers indeed gained the skills through WIL.

Govender and Wait (2017) conducted a South African study to investigate WIL benefits for Marketing and Human Resources students. A mixed model approach was employed to generate data (interviews and questionnaires) which showed that WIL built communication skills and confidence. Quantitative results (Govender and Wait 2017) reported that 82% of participants rated their entire WIL experience as highly rewarding. Furthermore, the study presented significant WIL benefits through induction, teamwork, building networks and contacts, meeting managers, allocating tasks and responsibilities and theory-practical linkages (Govender and Wait 2017). A quality WIL engagement may be characterised by the induction and preparation process, which are rigorous processes meant to reduce or eliminate incidents. Smith (2012) explains that induction entails offering support, workplace information and procedures to new entrants. The literature points out that lack of induction and proper task allocation may lead to ill-prepared students and poorly integrated practical learning (Ryan, Toohey and Hughes 1996; Abeysekera 2006; Smith 2012). The building of networks and contacts was supported (soft skills in **Figure 5**, page 83), where interpersonal, listening and communication skills were reported to play a vital role. Participants (68%) recommended companies from which they gained WIL experience to future students citing the following reasons:

> Students were treated well, and the mentor was helpful and professional, assisted students, the staff was supportive, the industry was a better place to learn, excellent communication, the industry is insightful, met different people, growth opportunity (Govender and Wait 2017: 61).

Overall, Govender and Wait (2017) indicated that WIL provided rewarding experiences which enhanced knowledge and skills in their disciplines. In comparison, my study used a qualitative research design and open-ended questionnaires to generate data and used thematic analysis to analyse the data. My participants were engineering TVET lecturers and company personnel, while the article explored Marketing and Human Resources students. However, professionalism, courtesy and communication were the soft skills indicated in the conceptual framework, which were necessary facets in the learning of industry practice.

George, Lawrence and Langenhoven (2019) explored South African TVET College Science lecturers' perceptions on WIL and the fourth industrial revolution (4IR). The study focused on TVET lecturers' perceptions on whether WIL curriculum addressed the 4IR. The study adopted a mixed-methods approach, combining both quantitative and qualitative approaches. A structured questionnaire was used to generate quantitative data from 10 TVET lecturers, while the interview generated qualitative data. The findings disclosed that the majority (78%) of TVET lecturers perceived that the WIL curriculum was outdated and did not address its current skills deficit (George, Lawrence and Langenhoven 2019). The literature supports that employers cited outdated training on irrelevant processes in the industry, which was blamed on the lack of revision of current curricula, and advocated for additional skills like attitudinal skills and information and communication technology (Papier 2017). Most TVET lecturers (60%) did not believe that TVET Colleges were adequately geared for the 4IR. Even though my study did not focus on the 4IR, it appeared that the 4IR skills were the same as the latest skills sought by TVET lecturers during WIL. Inti, Latib and Saud (2016) also explored the skills required by Nigerian polytechnic students as perceived by employers and TVET lecturers. TVET lecturers in my study underwent WIL exposure where the study sought to determine whether they acquired the latest skills.

Malale and Sentsho (2014) studied the perceptions of rural TVET college students towards their WIL placement at small, medium and micro enterprises (SMME) in Limpopo province, South Africa. The study explored the students' placement at SMME to change their perceptions and improve their work placement. Kolb (1984) ELT underpinned this research which was similar to my study. The study used a qualitative approach and generated data from interviews with ten TVET college students. The researcher also recorded notes in the researcher's journal. Students' responses indicated that they received more practical opportunities to learn different tools, performed minor services and gained confidence. Literature confirms (Papier 2017) that students perceived that workplace training provided opportunities that the college could not match, such as the pressure to meet target deadlines, workplace procedures and processes and legislation. Also, the study highlighted that some SMMEs did not meet safety and security standards. My study confirmed if lecturers got the same opportunity in the industry during WIL. Hence, students felt they were not protected during WIL due to a lack of adherence to safety protocols. Some students' responses pointed out that they were indolent because of too much work at small businesses where one did everything compared to big businesses where there is a line production with a routine sequence of operation (Malale and Sentsho 2014). My study determined if TVET lecturers had the autonomy to carry out all practical tasks independently.

2.5.4 CHAPTER SUMMARY

The literature review on the nature of TVET lecturers learning through WIL used TVET lecturers and students as participants and focused on their learning in different fields and contexts. Eight studies looked at the industrial attachment for TVET lecturers. Industrial attachment for students in TVET colleges and universities appeared in six studies. There was one article, which focused on students learning from teaching practice. From these studies, I established that TVET lecturers' attachment programme helped them elaborate on theoretical aspects more effectively and relate to technology's latest developments. TVET lecturers updated their skills and knowledge using new equipment and techniques used in industry, attending tradesmen events and industry networks. From the studies where students were on teaching practice, I confirmed that they also experienced WIL through exposure to their profession's realities. The studies, including TVET students on industrial attachment, introduced them to unfamiliar technology, which helped them appreciate the real world of work and practice the theoretical principles they learnt at college to transition to the world of work.

The reviewed literature on the kinds of knowledge that TVET lecturers gain through WIL involved students and TVET lecturers. Literature focused on their learning in different industries and contexts. Ten studies looked at the industrial attachment for TVET lecturers, while two studies investigated students on industry WIL and two others on teaching practice. These studies highlighted that TVET teachers gained technical knowledge and industry currency to operate equipment, tools and systems in the workplace, expertise in teaching methodologies and established communication networks. Furthermore, the value of in-depth subject knowledge was reinforced mainly when the lecturer included personal anecdotes of their time in the industry using different ways of explaining the same concept, demystifying and simplifying jargon (Smith and Yasukawa 2017). I also learnt that TVET lecturers developed pedagogical knowledge, content knowledge, curriculum knowledge, and knowledge of educational contexts related to competency-based learning in their increasingly complex work environments. They acquired helpful knowledge in the classroom.

The literature review on the conceptions and perceptions of TVET lecturers' learning through WIL included TVET lecturers and students focusing on the conceptions of their learning through practice. Seven studies explored lecturers' conceptions about experiences of their learning in industry. Eight articles also investigated the perceptions of students learning through industry practice. From the studies, I learnt that students perceived that a successful practicum placement could significantly influence current, relevant and valid skills and build confidence in them to look forward to gaining employment in a large and reputable business. I also established that the teachers gained self-esteem, confidence and pedagogical skills and communicated and established good relationships through WIL. Students perceived that industry training provided an opportunity to gain practical experience in an industry environment, link theoretical knowledge and practical experience, and gain confidence in future job opportunities. Lecturers further conceived that WIL would help improve the standard of teaching and learning through hands-on experience WIL. The next chapter discusses the theoretical and conceptual frameworks underpinning the study.

CHAPTER 3: THEORETICAL AND CONCEPTUAL FRAMEWORKS

3.1 INTRODUCTION

This study focuses on the nature of TVET lecturer learning during WIL. The study also strove to determine how the lecturers understood their learning as well as the kinds of knowledge that they gained. The previous chapter reviewed relevant literature for the study. This chapter discusses the theoretical and conceptual frameworks in which the study was located. Bryman (2012) and Jabareen (2009) define a theoretical framework as a lens on which the researcher positions the research to get a comprehensive understanding of the phenomenon under study and through which findings are viewed and explained. In this regard, I found that Kolb (1984) Experiential Learning Theory (ELT) provided a valuable tool to unpack and explain the TVET lecturer learning during WIL in the industry. Kolb's ELT relates to experiential learning, which is the focus of my study. As such, the theory would help to understand and explain my findings. McCarthy (2016) suggests that Kolb's theory accommodates all learners [including TVET lecturers], regardless of their learning priority or background. Using this theory allowed me to establish whether lecturers on WIL passed through all Kolb's stages of the experiential learning cycle. If TVET lecturers completed the cycle: concrete experience, reflective observation, abstract conceptualisation and active experimentation, they would probably conceptualise the knowledge and put it into practice in real-world situations.

To complement Kolb's theory, I also had to draw on Bergami and Schuller's industrial placement model to help understand the nature of learning and what happened within the actual stages that these TVET lecturers underwent during industry placement. Bergami and Schuller highlight six stages: industry placement, industry placement experience, industry placement skills, theory development, classroom teaching, and theory into practice. In the centre of Bergami and Schuller's model is a community of practice that focuses on community engagement, knowledge and skills acquisition and industry networks.

While Kolb's ELT and Bergami and Schuller's model of industrial placement were useful for unpacking, understanding and explaining the nature of experiential learning of TVET lecturers, they would not help me understand the kinds of knowledge gained during WIL. Therefore, I had to draw on conceptual frameworks (Shulman (1987); (Grossman 1990); Cline (2005); Ellis, Kisling and Hackworth (2014) related to the domains of teacher knowledge and soft skills. Miles and Huberman (1984: 18) describe a conceptual framework as: "a visual or written product that explains graphically or in narrative form, the main things to be studied, key factors or concepts and the presumed relationships among them". Therefore, in this study, the conceptual frameworks would give key concepts and terms to explain the knowledge emerging from the data gained by TVET lecturers during WIL. The conceptual frameworks, ELT, and Bergami and Schuller's model of industrial placement are discussed below.

The chapter begins with a discussion of Kolb's ELT, specifically the four stages: concrete experience, reflective observation, abstract conceptualisation and active experimentation. This is followed by a discussion on Bergami and Schuller (2009) model on placement in industry. The last section discusses conceptual frameworks drawing on Shulman (1987) and Grossman (1990) about the domains of teacher knowledge followed by soft skills from Ibrahim, Boerhannoeddin and Bakare (2017) and Ellis, Kisling and Hackworth (2014). The following section discusses Kolb's experiential learning theory.

3.2 KOLB'S EXPERIENTIAL LEARNING THEORY (ELT) BACKGROUND

Kolb's theory draws from the contributions of authorities such as Dewey (1938), Lewin (1946) and Rogers (1985). The theory was named ELT to emphasise the vital role of experience in the learning process, distinguishing it from other learning theories. Kolb, Boyatzis and Mainemelis (2001) state that the other reason for using experiential learning is its intellectual origins in Dewey and Lewin's experiential learning work. Different learning theories are connected to diverse philosophical viewpoints on the nature of knowledge. In this view, the historical development of Kolb's ELT in this chapter marks a starting from the earlier proponents, showing their key ideas and how they link or differ from each other, starting with Dewey.

3.2.1.1 John Dewey (1859-1952)

The philosophy underlying experiential learning is based on Dewey's theory of experiential learning. There has been a significant contribution to ELT by Dewey, a philosophical pragmatist. Yardley, Teunissen and Dornan (2012) suggest that John Dewey conceived experience as a target for long-lasting learning and development. According to Dewey, active, practical engagement and communication with the context help to gain applied rather than abstract knowledge. During WIL, TVET lecturers had practical experience using tools and machines during maintenance and repair and manufacturing. In addition, they communicated with artisans and other work colleagues and, through these practical engagements, experienced some learning. Dewey argued that education engaged learners and enlarged their learning experiences (Yardley, Teunissen and Dornan 2012).

Furthermore, Dewey (1938) proposed that the nature of experience is continuous, and the experiential learning cycle is necessary for the education and development of adults. TVET lecturers were on continuous industry placement for two years, which enabled them to master the practical processes involved. For example, they learnt safety precautions initially and had to apply those precautions in the workshop. Similarly, the lecturers encountered different tools during maintenance and then used (applied knowledge gained) the tools during work activities. Dewey views experience and reflection as the fundamental elements in the experiential learning process. Reflection is an active and intentional action where prior beliefs, assumptions, and implications are examined (Dewey 1933). During the WIL experience, reflection begins with some discomfort, probably from something having gone wrong, which leads to a balanced state of mind after determining what could have been done, which would then be done in subsequent attempts.

Dewey (1933: 17) further contends that “Reflection directs that experience to learning and deeper insights”. What Dewey suggests is that through reflection on the experience, learning occurs, and new insights are developed. When a problem arises from experiences, suggestions towards solutions come to one’s mind, acting on and testing during practice (Dewey 1938). Similarly, during WIL, some TVET lecturers were likely to meet problems and had to think of solutions. The focus and value of experience and reflection highlighted above made Dewey a significant proponent of experiential learning, which revolves around reflection. This inspired Kolb to develop his experiential learning notion (Yardley, Teunissen and Dornan 2012). Lewin also contributed to ELT and is discussed next.

3.2.1.2 Kurt Lewin (1890-1947)

Lewin, a social psychologist, focused on incorporating theory into practice in leadership styles and collaborative peer working. In my study, lecturers had to team up with artisans and other workmates in executing their tasks, and during these tasks, they had to integrate the theory learnt in college with the practical work they had to do. Smith (2001) reports that Lewin developed a four-stage cycle that involved: planning, observation, reflection and action. In the context of this study, TVET lecturers learning during WIL had to plan how to perform tasks on the work schedule, and observe their artisans demonstrating, for example, how to use a machine. Lecturers then had time to look back (reflect) on what they would have observed before they get to do it themselves. Lewin studied the interactions among training groups, for example, disagreements between learners' concrete experiences and teachers' conceptual models (Smith 2009). Experiential learning models were developed to solve workplace tensions (Argyris and Schon 1974; Kolb 1984). It appeared that Lewin predicted possible disagreements wherever people are working together, in this case, TVET lecturers and artisans during WIL, regarding their different opinions on the practical learning experience. In comparison with Lewin, Dewey was convinced that enquiry, experience and reflection are the key elements in experiential learning. Lewin, on the other hand, focused on reflection, planning, action and observation. Dewey and Lewin concur on practice and reflection. Experiential learning by Carl Rogers is discussed below.

3.2.1.3 Experiential Learning: Carl Rogers (1902-1987)

Rogers (1985) suggests that people need conducive environments, which provide self-disclosure, acceptance, and being listened to, and understood (empathised). Similarly, such environments were also vital for TVET lecturers to learn during WIL. Rogers (1902-1987) differentiated between cognitive learning (academic knowledge) and experiential learning (applied knowledge). Cognitive learning is the conceptual knowledge, the principles and ideas that TVET lecturers may have gained formally, while experiential learning is the applied practical knowledge like repairing a pump they were learning during WIL. Rogers and Freiberg (1969) list experiential learning characteristics as self-initiated, personal involvement, learner evaluation, and pervasive learner effects. During WIL, TVET lecturers had to involve themselves fully in performing the tasks in the industry. They had to have initiative; they had to be persistent and also reflect and evaluate their learning in order to gain significant practical experiences during industry placement. Carl Rogers believed that everyone could achieve their intended goals leading to self-actualisation (Rogers 1951). With the attributes highlighted above, TVET lecturers would learn more during WIL, which would boost their confidence in their fields. According to Rogers (1985), experiential learning was equated to personal change and growth, and he felt that all people naturally tended to learn while the teacher's role was to facilitate learning. WIL exposed lecturers to learning through facilitation from experienced artisans, and this learning would probably be growthful as it would enhance change through being better equipped with industry practical skills and would have a trade test qualification.

The tenets of Rogers's theory include:

(1) Setting a favourable learning environment,

(2) Explaining the goals to the learner,

(3) Organising and availing learning materials,

(4) Striking a balance between academic and emotional elements of learning, and

(5) Exchanging their thoughts and frame of mind with learners without controlling.

The industry experience period for lecturers' demands that they are inducted into the working environment before engaging in the practice. During induction, TVET lecturers are generally introduced to machines, equipment and materials used in the industry. Only through such a process do they get accustomed to and view the context as a favourable learning environment in the industry. The induction process also introduces and explains to TVET lecturers on WIL about the machines and the company goals that need to be achieved through the WIL journey.

Rogers (1985) proposed that learning was facilitated when: the student participated with full control of the learning process and its nature and direction. Lecturers on WIL had logbooks that stated the curriculum which they had to cover during industry experience. Hence, lecturers had control over what they had to learn during WIL as they could refer to their logbooks on areas to learn. According to Rogers, learning is facilitated when the student (TVET lecturer) participates in the learning process. During WIL, TVET lecturers participated fully as long as learning materials were availed to them. Determining progress in Rogers' theory is accomplished through evaluation as the primary method of assessing learning. The evaluation process for TVET lecturers in the industry occurred through quality assurance, where the quality of their work was checked against prescribed specifications. Rodgers's theory principles indicate that: substantial learning occurs when: subject matter is appropriate for the student's interests, learning is more easily comprehended when there are fewer outside risks, and self-initiated learning is the most lasting (Rogers and Freiberg 1969). Striking a balance between academic and emotional elements of learning would entail minimising industry risks through a compulsory industry induction process, ensuring that all new entrants were acquainted with the machinery, equipment and environment setting before any engagement. The last point on Rogers's theory may refer to industry personnel exchanging their thoughts and frame of mind with learners (TVET lecturers) without controlling and limiting them. When discussing work matters, the TVET lecturers may be given leeway to exercise their freedom in implementing solutions to tasks. The content of what the TVET lecturers learnt during WIL in the industry was deemed appropriate as this was guided by the specified curriculum in the logbooks.

While Dewey focused on active, practical engagement and reflection, Lewin focused on planning, observation, reflection and action. Dewey viewed experience and reflection as the fundamental tenets of the experiential learning process, which he believed occurred when learners (lecturers) get the opportunity to try out new behaviours and reflect on them (Dewey (1933). Kolb reflects experiential learning through the four constructs: concrete experiencing, reflective observation, abstract thinking, and active experimentation, while Dewey emphasises practice and reflection (Miettinen 1998). Through the highlighted steps, the lecturer experienced the use of machines, reflecting on the experiences, learning from the experiences and trying out what they learnt. Rogers focuses on the tenets listed above, incorporating cognitive and experiential learning and aligned with Dewey and Kolb's theories. Dewey, as highlighted above, emphasised practice, experience and reflection, while Lewin's emphasis was on planning, observation, reflection and action. The principles listed by Rogers: setting a favourable learning environment, explaining the goals to the learner, organising and availing learning materials, striking a balance between academic and emotional elements of learning, and exchanging their thoughts and frame of mind with learners without controlling. Having discussed the proponents who pioneered the experiential learning theory, the next section discusses Kolb's ELT theory.

3.3 KOLB'S ELT

Building from the above theories, Kolb explored the perception of concrete experiences and associated learning styles, which led to ELT development, shown in **Figure 2** below. Experiential learning in my study involved learning from actual industry experience. Kolb established his experiential learning theory in 1984, which portrays learning as appearing in a cycle with four stages: concrete experiencing, reflective observation, abstract thinking, and active experimentation (Kolb and Kolb 2009). In this regard, Dewey also views experience and reflection as the key experiential learning elements, while Lewin considered reflection, planning, observation and action. Building from these theories, Kolb explored the processes linked to concrete experiences. Both Kolb and Dewey concurred that the nature of experience is continuous (Dewey 1938; Kolb 1984). Kolb's four-step experiential learning cycle, which the learner goes through to transform an experience into learning, are discussed below.

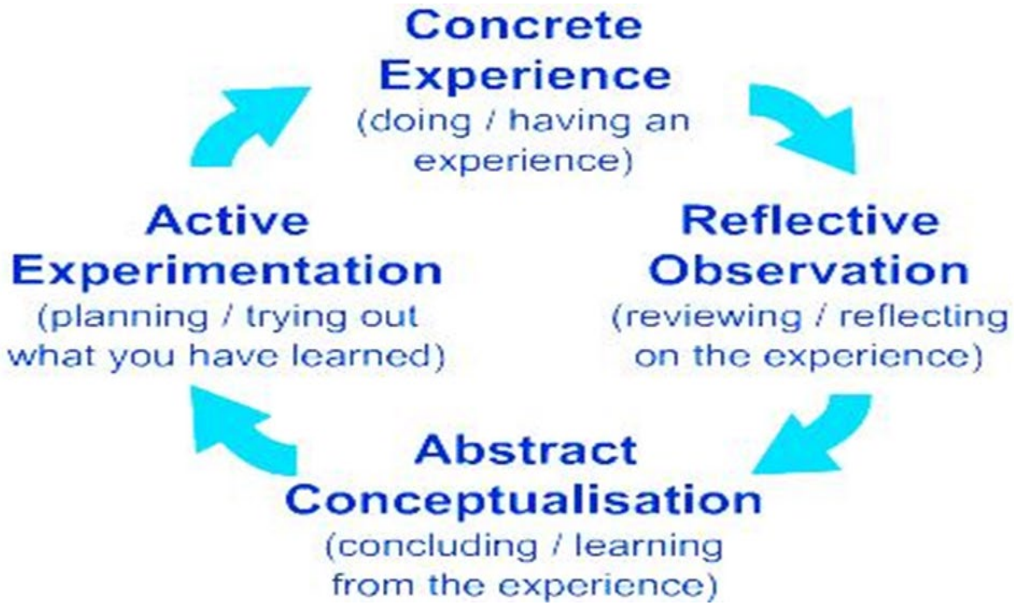

Figure 2: ***Kolb's experiential learning cycle***

Source: Kolb (1984: 38).

Notes: **Figure 2** shows Kolb's experiential learning cycle. The cycle revolves around four stages: concrete experience, reflective observation, abstract conceptualisation and active experimentation. Further details of each stage and their application in this study are amplified in subsequent segments of this study.

3.3.1 Stage one – Concrete Experience

The first stage in the cycle is the concrete experience, which refers to actual doing or acting from experience. For instance, the lecturer experiencing the practice of handling a machine for the first time through touching and doing would probably enhance learning during WIL. A person passes through stages repeatedly in a way which helps them to learn and take the new experiences into the future (Kolb 1984; Curtis, Helion and Domsohn 1998). When TVET lecturers participate in real-life experiences (practical processes) in the industry, they gain concrete experiences through these engagements. Konak, Clark and Nasereddin (2014) support that concrete experience means performing new tasks from direct practical experience. TVET lecturers in the construction industry carry out a particular action like building a nine-inch wall and see the effect of that action. Also, Chan (2012) confirms that concrete experience is gained when one experiences and performs practical duties. In this study, lecturers gained experience through working with tools, installing and repairing equipment. Concrete experience is described as learning from specific experiences or actions, relating to people, and being sensitive to their feelings (Jenkins and Clarke 2017). Lecturers also probably learnt different civil engineering skills like footing and building a foundation, repairing gadgets and electrical equipment and carrying out maintenance and repair in the mechanical trade. Lecturers related to supervisors who were supervising them and were sensitive to their feelings, as they had to follow instructions by listening and doing as advised by artisans.

3.3.2 Stage two – Reflective Observation

Reflective observation refers to going back to the starting point of the task and reviewing what was done (Kolb 1984; Sharlanova 2004). The TVET lecturer from this context would be thinking about the experience, re-playing the use of the machines, for example, critically analysing it, asking such questions as what happened, why did things happen that way, and who or what contributed to it (Kolb and Kolb 2009). In addition to this, drawing on Mukeredzi (2015), the TVET lecturers would probably think about how they felt during the experience and why they felt that way. During this phase, TVET lecturers reflect on a task undertaken during the concrete experience stage and share their reactions with the team members. According to Meijer, Korthagen and Vasalos (2009), reflection can promote deep learning and good professional behaviour. Lecturers, through reflection, had an opportunity to learn and reinforce how to use intelligent machines like CNC and work well with others according to industry prescripts. Recent work by Korthagen (2016) shows that reflection helps teachers develop their learning theories under professional guidance. Therefore, reflective observation in the context of this study comprised thoughtful questioning where TVET lecturers thought back and re-played their hands-on experiences. Jenkins and Clarke (2017) and Clark (2011) describe this stage as watching and observing before making judgements by viewing the environment from different viewpoints. Thus, the TVET lecturers would probably engage in serious thought about their concrete experience before making any conclusions. Gibbs (1988a) closes the argument by saying that a lack of reflection on the experience may lead to quickly forgetting it or losing its learning potential. In other words, learning would emerge from reflection on experience.

3.3.3 Stage Three – Abstract Conceptualisation

Abstract conceptualisation is about the learning that emerges from reflecting on the experience. Mukeredzi (2015) emphasises that learning is from reflection on the experience and not simply from the experience itself. In the context of the study, the lecturer made sense of practical experiences gained and tried to understand the relationships between them (Kolb and Kolb 2009). TVET lecturers rigorously asked themselves what they learnt and the meanings of the practical experiences and tried to understand by drawing from the questions they raise in reflective observation. This would be the stage at which the TVET lecturer would draw conclusions and generalisations derived from the first two stages of the cycle.

Further, during this stage, the TVET lecturer took a back step from their experiences to think and draw applicable real-life conclusions from the individual experiences (Kolb and Kolb 2018b). At this stage, often the learner asks and answers questions like what should have been done differently or what should be done differently to improve the situation or uphold the good performance in the following engagements (Mukeredzi 2019). At the same time, the industry personnel asked the TVET lecturers to summarise what they had learnt. When they answered this question, the new learning was tested in the next stage of active experimentation. The TVET lecturer during WIL at this stage of ELT searched for the meanings of their practical experiences and engagements. The learner starts to think logically, analyses ideas, and acts on the intellectual understanding of different situations (Jenkins and Clarke 2017). Lecturers, in this instance, thought and acted following the correct sequence when carrying out tasks in different work settings.

3.3.4 Stage four - Active Experimentation

The last stage is active experimentation, which involves planning and trying out another concrete experience based on what they had learnt during their previous practical experience, applying it to another situation or task. From the ELT, some new practical experiences are attained with new ideas and simulations by working with practical applications (Kolb 2014). In this study, during this phase, TVET lecturers planned and tried out a new concrete experience based on what they had discovered and how they did this differently. In other words, they experimented with and practiced what they would have learnt and how they could have done it better or differently (Gosling and Moon 2001). Lecturers got a chance at this stage to review each other's work and helped each other to develop strategies for subsequent action.

Each of Kolb's four stages refers to specific activities which occur over time. For example, mechanical and electrical lecturers simulate electrical training equipment like the electrical installation trainer and mechanical training simulators, followed by doing the actual task in the workshop or plant. Kolb’s ideas on reflective observation were also found in Lewin as reflection and observation. The four key principles of Lewin: reflection, planning, action and observation, summarise Kolb’s ideas. Action is concrete experience; observation and reflection is reflective observation. To engage in concrete experience, planning must be done first to ensure the action is executed accordingly.

The study thus sought to establish whether the TVET lecturers studied went through all Kolb’s stages or only some of the stages and whether the stages were experienced in a linear form.

3.3.5 Weaknesses of Kolb’s (1984) ELT

While Kolb (1984) ELT remains the most influential model of experiential learning, there are weaknesses highlighted by authorities like Morris (2020), Seaman, Brown and Quay (2017), Javis (2012), and Bergsteiner, Avery and Neumann (2010). Morris (2020) and Jarvis (1995). Generally, the researchers argue that Kolb’s ELT lacks sound theoretical and empirical foundations, and a limited number of studies have sought to explore the model. For example, the test-retest measurements for Kolb’s theory did not reliably assess the learning styles of the learners (Seaman, Brown and Quay 2017). Another critique was raised by Seaman, Brown and Quay (2017: 61), who said: “The phases of the learning cycle do not connect in any organic or necessary way”. From this standpoint, Dewey (1933) states that the idea of phases or steps pulls in opposite directions of an ideal way of thinking and reasoning. In this study, the issue of phases not connecting or steps pulling in different directions did not apply as TVET lecturers learning during WIL was guided by logbooks, which reflected the curriculum content that they had to learn. Thus, following Kolb’s sequence would not affect the results. This study would instead, establish whether TVET lecturers in their learning, sequentially followed the stages proposed by Kolb.

Smith (2010) claims that Kolb’s theory was used in a limited range of Western world cultures. However, the TVET lecturers learning in industry were guided by a company culture that unified all employees into the company norms and practices. For example, dress code, safety practices and company values need to be consistent. If lecturers lacked clear company values and safety guidelines, communication with company personnel would be inconsistent and unclear, leading to confusion and even workplace accidents.

Kayes, Kayes and Kolb (2005) argue that Kolb's theory does not assign timelines to the stages to enhance the ELT structure. In this study, the TVET lecturers used logbooks, which stipulated the time spent on each skill. In addition to drawing on logbooks to ensure timelines are maintained, I drew on Bergami and Schuller's model to understand what happens in the ELT stages when the TVET lecturers pass through them.

Dennison (2012) says that Kolb's ELT does not apply to all situations and provides a limited number of factors that influence learning. Kolb's theory does not explain the psychodynamic, social, and institutional aspects of learning (Vince 1998). Psychodynamic is the relation between conscious and unconscious mental and emotional forces that determine personality and motivation. In the same vein, McGlinn (2003) adds that ELT does not consider the context of power relations like cultural dominance, gender and social status. My study outlines all power dynamics - the roles of the training managers, artisans and TVET lecturers who are the learners and their position during WIL in the industry.

To further reinforce and strengthen Kolb's theory and Bergami and Schuller's model, I draw on conceptual frameworks as alluded to above. The following section discusses Bergami and Schuller's model on teacher industry placement.

3.4 BERGAMI AND SCHULLER'S (2009) INDUSTRY PLACEMENT MODEL

The placement in industry model illustrated below complements Kolb's (1984) ELT in this study as it enhanced unpacking and explaining the TVET lecturer's learning through WIL. Bergami and Schuller (2009) industry placement theoretical model is shown in **Figure 3** below.

Figure 3: Placement in Industry: A Theoretical Model

Source: Bergami and Schuller (2009: 201).

Notes: **Figure 3** shows Bergami and Schuller (2009) theoretical model on teacher placement in industry. The model helps to explain the kinds of knowledge gained during WIL.

The theoretical model by Bergami and Schuller (2009) is described by six boxes showing placement steps in the industry. The six steps include: industry placement, industry placement skills, industry placement experience, theory development (from reflection on practice), classroom teaching and theory into practice. Bergami and Schuller (2009) commend that the engagement between students (TVET lecturers) and industry should enable forming a group of individuals with different interests, making diverse contributions, and having various ideas. In this case, even though TVET lecturers were the primary beneficiaries of WIL, the company was also likely benefit from the lecturers through their ideas participation in different processes during the company operations. In this context, both industry personnel and the TVET lecturers on industry WIL contributed to a particular industry production. The stages of Bergami and Schuller's model are described below, starting with community engagement.

3.4.1 Community Engagement

At the centre of Bergami and Schuller (2009) model is community of practice comprising Community Engagement, Knowledge and Skills and Community Engagement. Community Engagement - according to Bergami and Schuller (2009), the host company may be willing to extend its host role beyond the industry placement for the academics by offering internships for students. In this case, this becomes community engagement between the college, the TVET lecturer on placement and the host company. Besides community engagement, Bergami and Schuller (2009, 2011); Bergami, Schuller and Cheok (2011) identified another two main elements within community of practice in industry placement: Knowledge and Skills Acquisition and Industry Networks.

Knowledge and Skills Acquisition - The acquisition of new knowledge and skills is inherent in all processes. Consequently, these elements are of interest to both the lecturer on placement and the host company. As the TVET lecturer confronts industrial exposure, new learning ensues, and new skills are acquired. Some of this knowledge may be useful in the classroom context.

Industry Networks - The placement experience provides the TVET lecturer with opportunities for developing strong industry networks within the host company, which can be a powerful resource in teaching and learning (Bergami and Schuller 2009). In other words, if relations are developed between the TVET lecturers in the industry during WIL, this develops into lasting networks that may benefit their practice back at the colleges. Surrounding the centre of Bergami and Schuller's model are six key concepts discussed in the following section.

3.4.2 Industry Placement

The industry placement considers the period, duties to be performed, the length of the attachment, and the expected contribution level. The placement can either be a refresher course where, in this case, the lecturer strives to be updated on current practices or a new skills placement where the lecturer needs to acquire new knowledge and skills for the first time (Bergami, Schuller and Cheok 2011). This was the case in this study, where lecturers sought to develop new knowledge and skills through the WIL process. Industry placement experience is discussed next.

3.4.3 Industry Placement Experience

At this stage, the lecturer or student is exposed to the industrial activities of the host company where the placement takes place. Irrespective of the industry sector, the TVET lecturer encounters a period of adaptation and adjustment to the host company's culture. The placement experience should benefit all parties involved, the lecturer on placement and the host company, as mutual engagement create an ideal context for knowledge acquisition and building required competence (Wenger 1998). In the context of this study, the lecturer benefits through learning exposure while the industry gains from the lecturer services. Another aspect of the model is industry placement skills.

3.4.4 Industry Placement Skills

While on industry placement, the TVET lecturer in this study had access to various networks and channels of information that provide valuable insights and feedback about new or improved industrial processes and other forms of organisational knowledge. They (TVET lecturers) observe, analyse, reflect, deconstruct and reconstruct the workplace processes, thereby gaining new insights that should enable progression to the next step in the model (Bergami and Schuller 2009). The next section discusses theory development.

3.4.5 Theory Development (From Practice)

According to Bergami and Schuller (2009, 2011); Bergami, Schuller and Cheok (2011), the experience gained from an industry attachment should enable the student (TVET lecturer) to consider existing theoretical perspectives and adapt existing theories or develop new ones in response to the experience. In this study, the lecturer views the attachment processes through a neutral lens and is regarded as an impartial observer whose comments and suggestions may improve existing industrial processes. The nature of learning and engagements that these TVET lecturers experience remains to be established in this study. The lecturer may further expand their teaching repertoire when they eventually return to the lecture room by drawing on industry placement experiences to enrich classroom teaching and learning practices (Bergami and Schuller 2009). The following section shows how classroom teaching can be enhanced through WIL.

3.4.6 Classroom Teaching

While this is outside the scope of this study, the industry exposure enables the TVET lecturers to update teaching materials to reflect and include new industrial developments. Industry exposure also helps to utilise industry resources in a partnership designed to enhance classroom teaching and learning, which also includes lecturer visits to industrial sites for a first-hand view of the industry processes (Bergami, Schuller and Cheok 2011). This study, as highlighted, is, however, not extended to classroom practices. A discussion on putting theory into practice follows.

3.4.7 Theory into Practice

In the context of this study, as Bergami and Schuller (2009) point out, the TVET lecturers would capitalise on opportunities to test the newly developed or adapted theories with industry. In these circumstances, the lecturer would be seen as someone making a meaningful contribution to the host firm. The placements should ideally occur at regular intervals to keep the skills alive and relevant. However, in this study, the attachment was for a continuous period of 24 months. The last aspects of knowledge and skills acquisition and industry networks are discussed below.

3.5 CONCEPTUAL FRAMEWORKS

As highlighted in the introduction, I used conceptual frameworks on domains of teacher knowledge to understand the kinds of knowledge the lecturers gained in industry during WIL. These are discussed in the next section.

3.5.1 Shulman (1987) domains of teacher knowledge

Domains of teacher professional knowledge for teaching were initially advanced by Shulman (1987) as pedagogical content knowledge, general pedagogical knowledge, content knowledge, curriculum knowledge, knowledge of learners and their characteristics, knowledge of educational contexts, knowledge of educational ends, purposes and values, and their philosophical and historical grounds. Other scholars like Magnusson, Krajcik and Borko (1999), Banks, Leach and Moon (1999), and Grossman (1990) also worked on these domains. **Figure 4** below reflects a diagrammatic representation of domains of teacher knowledge drawn from Shulman (1987).

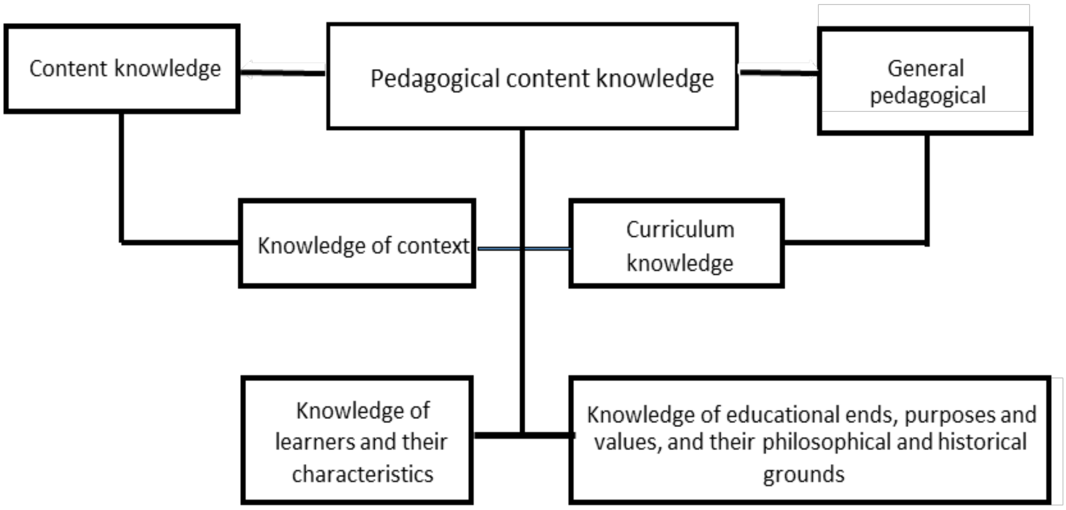

Figure 4: Domains of teacher knowledge

Source: Designed by author. The domains are drawn from Shulman (1987), Grossman (1990), Banks, Leach and Moon (1999) and Magnusson, Krajcik and Borko (1999).

Notes: Figure 4 presents the domains of teacher knowledge as proposed by Shulman (1987).

From all the domains, I discuss general pedagogical knowledge, curriculum knowledge and knowledge of contexts that appear to be relevant to my study on TVET lecturer learning during WIL.

The first domain of knowledge is general pedagogical knowledge.

3.5.1.1 General pedagogical knowledge

General pedagogical knowledge (GPK) refers to the wide-ranging principles and approaches of classroom administration and organisation that appear to transcend subject matter (Shulman 1987). With regard to TVET lecturer learning during WIL, this would relate to their learning of how to organise tasks and processes according to the work schedule in the industry. In this regard, Grossman (1990) states that most studies on teaching focus on GPK. GPK consists of a frame of wide-ranging information, opinions, and skills related to teaching and knowledge and beliefs regarding learning and learners (Grossman 1990). In this study, GPK is about 'how to' perform tasks, for instance, how to use particular machinery, such as lathe, milling, and grinding machines, to achieve a result. Thus, GPK relates to the broad skills and methods that TVET lecturers attain, including operating or repairing specific items during WIL.

Similarly, Borko and Putnam (1996) state that a practitioner's GPK comprises teaching methods that remove a discipline's content complexities. In this case, TVET lecturers would be learning processes or methods of using certain machinery in industry processes to achieve, for example, required fits and tolerances, allowing for correct parts assembly. Therefore, during WIL in this study, the TVET lecturer would probably learn how to engage in industrial processes, machines, procedures, and industry tools. Another domain of knowledge gained by TVET lecturers during WIL was the knowledge of contexts.

3.5.1.2 Knowledge of contexts

Shulman (1987: 8) says: "Educational contexts range from working of a group or class, control, governance, and financing of school districts to communities and cultures' character". In other words, this would imply how the industry community operates, their ethos and practices, including daily routines. In addition to what Shulman stated, Cogill (2008) suggests that knowledge of context implies understanding the school culture, available teacher support, relationships among staff and learners or parents, and instructors' attitudes. This study's knowledge of context implied understanding of the industry setting in which the TVET lecturers are attached and perform their duties. During WIL in the industry, lecturers in this study learnt that they were required to adhere to industry safety protocols and follow instructions and work schedules outlined by company personnel. Such knowledge includes understanding the prospects, opportunities and restraints imposed by the teachers' district administrative office on the teacher (Rahman *et al.* 2010). Grossman (1990) in Mukeredzi and Sibanda (2016) explain the knowledge of context as an appreciation of the setting where teachers perform their instructional responsibilities, including understanding the changes, expectations, and limitations imposed on the teacher by the monitoring and support management teams. Therefore, the TVET lecturers were expected to understand the different cultural backgrounds and abilities of the community of workers in the industry where they were placed for WIL.

TVET lecturers were expected to develop a broad understanding of the particular TVET context in which they are carrying out WIL, particularly their working circumstances. Additionally, knowledge of context includes the company environment, particularly its norms, cultures, practices, approaches and guidelines and other contextual factors at the company level (Seufert, Guggemos and Sailer 2021). In addition, the TVET lecturers on WIL would also need to understand and gain knowledge of other employees or other TVET lecturers in the company and their particular strengths, weaknesses and interests. Knowledge of context represents all the aspects that the TVET lecturer needs to be aware of in the workplace environment, its surroundings, culture and equipment. The last domain to be discussed in the subsequent section relates to curriculum knowledge.

3.5.1.3 Curriculum knowledge

Shulman (1987) regards curriculum knowledge as a grasp of the materials and programmes that serve as "tools of the trade" for teachers. Shulman (1986: 10) explains curriculum knowledge as:

> "materia medica of pedagogy (body of knowledge and the teaching and learning materials), the pharmacopoeia (quality control of the teaching and learning material and process) from which the teacher draws those tools of teaching that exemplify particular content."

In this case, the TVET lecturer was expected to understand and have a grasp of the learning programme and materials/machinery that they were required to experience during WIL. Such experiences included different machine types and their operations, materials and alternatives, tools, procedures, proper terminology, and how to carry out demonstrations. These processes were outlined in the logbooks according to trade test preparation requirements. According to Shulman (1987), curriculum knowledge also encompasses knowledge of any examination schedules that must be considered and any national, regional, local and or contextual requirements to be considered. In this context, the TVET lecturers on WIL should learn and understand trade testing materials and knowledge and any other contextual trade test requirements considered. In this study, curriculum knowledge referred to the trade testing material that the TVET lecturers on WIL were required to cover in preparation for writing their trade tests. The success of WIL depends on the cooperation of different role players like colleges, employers, SETAs, artisans and lecturers who agree on the WIL placement process (Simon, Pauline and José-Luis 2014).

Consequently, knowledge of context represents the company or training centre situation where the TVET lecturer needs to consider for better performance. Having discussed the kinds of knowledge related to domains, Mukeredzi (2020) discovered that adult learners also gained soft skills at the workplace. The next section discusses soft skills.

3.6 SOFT SKILLS

Murgor (2017) and Maniscalco (2010) refer to soft skills as a group of qualities, personality traits, habits, behaviour and courtesy, which employees tend to have at varying levels. These skills are necessary for daily life as far as they are needed for work. Soft skills are the non-technical skills, abilities, and abstract personality skills that establish one's strength as a leader, conflict mediator, negotiator, and listener (Cline 2005). Ibrahim, Boerhannoeddin and Bakare (2017) list several common examples of soft skills: having a winning attitude, being a team player, ability to communicate effectively, displaying confidence, sharpening creative skills, accepting and learning from criticism, self-motivation, leading others, taking risks, multitasking, and being able to prioritise essential tasks in their order of preference. The traits align with Cline's description that soft skills are intangible, yet they impact on employee performance.

Ellis, Kisling and Hackworth (2014) add work ethics, courtesy, teamwork, self-discipline, self-confidence, conformity to prevailing norms, and language proficiency as other critical soft skills components. All the highlighted soft skills would be vital for the TVET lecturers. For example, with self-discipline and self-confidence, TVET lecturers navigated and adapted to the industry environment and situations and built amicable relationships.

Scholars such as Payne (2018) and Ellis, Kisling and Hackworth (2014) identified soft skills as vital to business success in the workplace. Often, once employees gained soft skills, they could integrate them with their prior hard skills for improved work performance, as illustrated in **Figure 5** below. Other products of soft skills are often related to good work ethics characterised by being time conscious, self-motivation and a desire to be productive. It appeared that the soft skills enhanced employee work-readiness and relationships to meet workplace demands. Ibrahim, Boerhannoeddin and Bakare (2017) indicate that in today's technology age, survival in this dynamic and competing corporate world is dependent on the workforce having to acquire soft skills. Technology edge implies the use of computers and computer skills to execute tasks. Rothwell and Arnold (2007) suggest that most current employers expect employees to display excellence in soft skills like teamwork, time management, and communication, enhancing company productivity.

In the context of this study, soft skills would enhance the learning of the TVET lecturer during WIL. For instance, teamwork skills helped the TVET lecturers to work together with colleagues in accomplishing tasks. These skills would generally be required to function in specific employment environments as they include a wide range of skills and personalities across workers. My study tried to establish the type of soft skills that the TVET lecturers gained during WIL. **Figure 5** below shows soft skills, as suggested by the authorities cited above.

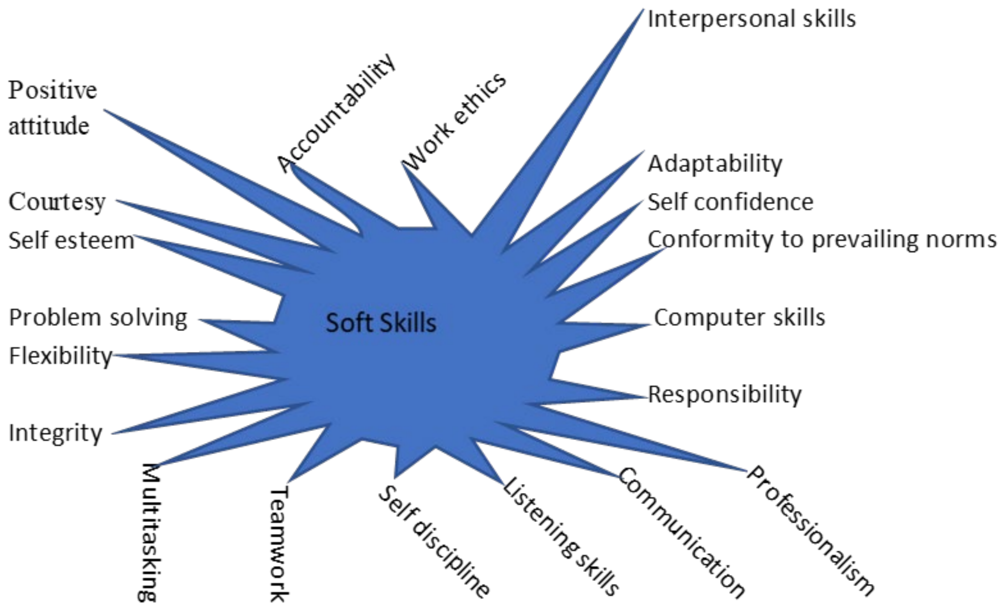

Figure 5: ***Soft skills***

Source: Designed by author to show different soft skills.

Notes: The skills in **Figure 5** were borrowed from proponents chosen on soft skills (Ellis, Kisling and Hackworth 2014; Payne 2018); Murgor (2017); (Cline 2005). Soft skills are explained as positive attributes, behaviour, attitude and interpersonal skills that improve job performance (Binsaeed, Unnisa and Rizvi 2017). Soft skills are meant to ease interaction and execution of tasks.

Figure 5 above reflects some of the important soft skills vital for the workplace. Teamwork would be crucial for TVET lecturers learning in industry, as they would have to report to artisans and follow instructions on tasks. Those working on CNC machines or planned maintenance would need computer skills to succeed in their operations. Another study ranked soft skills: ethical standards and integrity, work ethics, self-direction and initiative, listening skills, communication, dependability, and accountability as the most essential personalities (Ellis, Kisling and Hackworth 2014). Since TVET lecturers were placed in different companies, they were obliged to adhere to company ethos, communicate with their supervisors, and show accountability and dependability through punctuality and attendance. Dean (2017) stressed the value of soft skills and highlighted the difficulty in finding qualified personnel with sufficient soft skills in communication, interpersonal relationships, problem-solving, and personal qualities like self-esteem and motivation, which are critical for workforce productivity. This is because soft skills are often not formally gained but learnt as tacit knowledge at the workplace. From literature, Schmidt (2019) suggested that TVET lecturers had double roles: being a professional teacher and a tradesperson at the same time. Therefore, as highlighted above, such skills would help facilitate interpersonal relations, which were crucial for TVET lecturers learning during WIL to penetrate the industry networks. To that effect, the Office of Vocational and Adult Education (OVAE) in the United States responded to employers who said that soft skills were required in industry and added them to their training programmes (Ellis, Kisling and Hackworth 2014; Payne 2018). While TVET lecturers generally learn practical skills in industry, they also needed to learn soft skills to enhance practical skills application.

Furthermore, research showed that several learning objectives were often completed through soft skills by blending cognitive knowledge with application and synthesis. Therefore, Ellis, Kisling and Hackworth (2014) presented that employers required soft skills and competencies to interpret and communicate information to colleagues and clients, work with diversity, exercise leadership, negotiate decisions, seeing in imagination, integrity and honesty. During WIL, lecturers need to learn and exhibit creative thinking, which would enhance problem-solving when performing tasks independently. Their successful learning in industry would come through good listening skills, which would assist in making sound decisions.

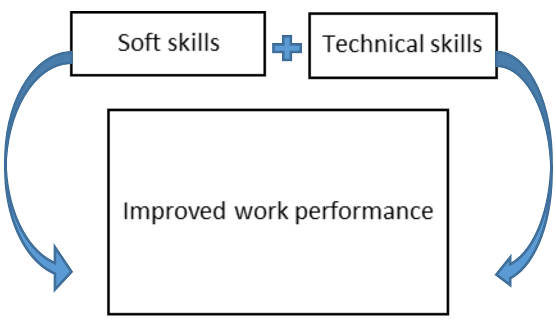

Figure 6: Impact of Soft skills

Source: Designed by the author.

Notes: **Figure 6** above shows the relationship between soft and technical skills as complimentary enhancers of workplace productivity. The learning of soft skills is perceived to improve and enhance the application of technical industry skills.

In essence, soft skills should complement hard and technical skills, which are the technical requirements of a job (Ellis, Kisling and Hackworth 2014). To be competitive in the present industry, the workforce needs to have soft skills in addition to technical skills. Generally, for a house to get finished, tradesmen such as builders, plumbers, pavers, glazers, electricians, carpenters, plasterers, and painters are required on site. Soft skills are required to discuss, negotiate and share ideas and resources. Therefore, the study sought to determine the kinds of knowledge that TVET lecturers on WIL gained, including soft skills.

3.7 CHAPTER SUMMARY

This chapter discussed the theoretical and conceptual frameworks on which the study was grounded. The chapter commenced by discussing the historical development of Kolb ELT, commencing with ideas of the earlier proponents like Dewey (1938), Lewin (1946) and Rogers (1985), whose main ideas concurred with experiential learning. These ideas offered Kolb a foundation for his ELT. The cyclic stages of Kolb's theory: concrete experience, reflective observation, abstract conceptualisation and active experimentation were then discussed. Kolb's ELT stages would enable understanding and explaining the nature of experiential learning. Following Kolb's ELT, the chapter also discussed Bergami and Schuller (2009) industry placement model, which I incorporated to complement Kolb's theory and help explain what happens within the different stages.

The conceptual frameworks around domains of knowledge (Grossman (1990) and Shulman (1987)) were also discussed, where GPK, context knowledge and curriculum knowledge were discussed to help understand the domains of knowledge gained by TVET lecturers during WIL. Conceptual frameworks related to soft skills (Ibrahim, Boerhannoeddin and Bakare (2017), Ellis, Kisling and Hackworth (2014) and Cline (2005) were also discussed where communication, computer skills, teamwork and interpersonal skills emerged as some of the key soft skills among others, generally gained at the workplace which TVET lecturers also gained through WIL.

In the next chapter, I present the research design and methodology of this study.

CHAPTER 4: RESEARCH DESIGN AND METHODOLOGY

4.1 INTRODUCTION

This chapter explains in detail and justifies the methodology used to answer the research questions. The methodology enabled me to establish what and how TVET lecturers learn through WIL by exploring TVET lecturers learning through WIL in three TVET colleges in KwaZulu-Natal in South Africa. The previous chapter outlined the theoretical and conceptual frameworks underpinning the study. Since a framework is a basic structure underlying a concept, it provided a positioning in the interpretive paradigm, which adopted a qualitative approach and convenience sampling design where available and accessible TVET lecturers and company personnel were selected.

Cohen, Manion and Morrison (2017) explain that the interpretive paradigm is concerned with understanding the world from individuals' subjective experiences. Observations complemented the interviews. The data were analysed qualitatively using the inductive process of organising the data into themes. In presenting the research design and methodology that I selected for this study, first, I discuss the paradigm that influences how I conduct my study. Second, I describe the research design, which positioned the study in qualitative research. Third, I present a qualitative approach. Fourth, I discuss the population of TVET lecturers. This initiates the fifth move into sampling methods and piloting. Sixth, methods of data generation, analysis and limitations are highlighted. Seventh, research rigour was explained through trustworthiness and its tenets. Lastly, ethical considerations taken to safeguard the welfare and rights of research participants conclude the chapter.

To understand the nature of TVET lecturer learning through WIL, the following critical research questions presented in Chapter 1 guided this study:

- How do TVET lecturers learn through WIL?
- What are the kinds of knowledge that TVET lecturers gain through WIL?
- What are the conceptions of TVET lecturers’ learning through WIL?
- What could be a suitable model for TVET lecturer WIL implementation?

Figure 7 below shows the research path I followed, as derived from Saunders, Lewis and Thornhill (2012).

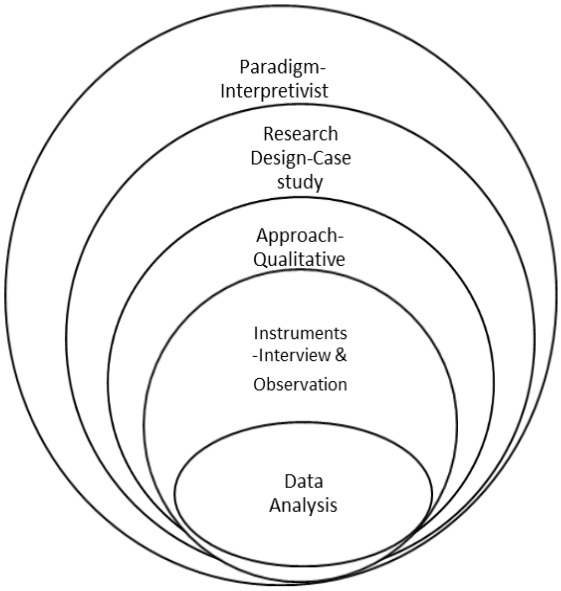

Figure 7: Research Onion

Source: Saunders, Lewis and Thornhill (2012: 59).

Notes: **Figure 7** outlines the research strategy followed in this study. This strategy was based on the research purpose and the data required.

Figure 7 displays the research path that I used to generate data. The outer layer shows the research philosophy, which may influence data generating and analysis. The branch of philosophy I chose is the interpretivist paradigm. The research approach informed the type of research, which was qualitative. Data generating methods were face-to-face interviews and non-participant observations. Lastly, the onion shows the data analysis as the last step. The steps shown in **Figure 7** above are explained next, starting with the research paradigm.

4.2 PARADIGM

Paradigm is defined as the philosophical intent or beliefs for undertaking a study (Klein and Myers 1999; Cohen, Manion and Morrison 2017). My study intended to explore if TVET lecturers understood their learning in industry during WIL. Hennink, Hutter and Bailey (2020) argue that paradigms provide information on a phenomenon and what and how it could be studied and understood. The argument aligns with my study, where I seek to understand the nature of TVET lecturers learning through WIL. There are different types of paradigms which are critical, positivist and interpretive. Interpretivism states that human behaviour can only be studied by using more qualitative and non-scientific methods. Positivism determines the validity of knowledge derived from empirical evidence and assumes reality exists (Kara 2018). The critical paradigm intends to take an impartial approach to social study to show the truths that may have fallen through the cracks (Kara 2018). A paradigm points to the major research assumptions in a study. This study focused on exploring WIL, analysing and understanding different work processes and examining how the TVET lecturers understand their learning based on their interactions. The world of TVET college lecturers was understood within the interpretive paradigm (Schutt 2006). The definitions show that a research paradigm influences how I conducted my study.

Therefore, I adopted an interpretive paradigm that points to how I generated data and analysed it. The WIL for TVET lecturers was explored within the interpretivist paradigm to understand what they learn and how they do it from their subjective experiences. I relied on the participants' views, meanings and experiences of WIL. Thus, interpretivism is about understanding the world from subjective experiences and perspectives of the researched – in this case, to understand TVET lecturers' learning through WIL. Blanche *et al.* (2006) argue that interpretive research depends on first-hand interpretations and attempts to describe what it sees in rich detail. The interpretive paradigm allows the researcher to get inside the person and understand from within (Cohen, Manion and Morrison 2017). From this assertion, I understood what lecturers learnt in the industry during WIL.

According to Blanche *et al.* (2006) and Guba (1990), the interpretive paradigm assumes inter-subjective, ontological, epistemological and axiological logical assumptions. These issues provide a foundation on the nature of reality that can be known about the study. The three concepts are described below.

4.2.1 Ontological assumptions

Ontology is explained as the nature of reality (Edelheim 2014; Jennings 2018), concerned with the identification of an existing phenomenon. In this study, I explored TVET lecturers learning through WIL to determine what and how they learnt through WIL. Through the simulation of different processes on automated machinery, lecturers were able to attach meaning to reality. Ontologies of WIL may refer to how engineering processes and terminologies are foregrounded and understood. In this regard, Guba and Lincoln (1981) argue that the ontological assumptions respond to questions about the nature of reality. In the world of my research, I assumed that the TVET colleges and industry are a world populated by people who have their views, understandings and meanings. Therefore, this study utilises case study as a method focused on TVET lecturers' industry experiences, views, and feelings. Pring (2004) says that the purpose of the research is to explain an existing situation or what has occurred. Ontology aims to establish realities of how and what TVET lecturers learn in the industry during WIL.

4.2.2 Epistemological assumptions

Epistemology represents my relationship with reality and how it is captured or known (Killam 2013). Another viewpoint comes from Crotty (2003), who describes epistemology as a way to understand and explain how we know what we know. The epistemological stance used in this particular research is basically constructionism. Crotty (2003) explains constructionism as an understanding that all knowledge and reality depend on human practices, constructed from the interaction between people and their world and developed and conveyed within a social setting. Therefore, the meaning is not discovered but constructed. It implies that TVET lecturers' learning during WIL depends on their interaction with artisans, supervisors and other team players at the host employer. According to Moyo (2017) and Crotty (2003), objectivist epistemology contends that my mind is considered separate from the world of objects of what I investigate. In this study, I employed non-participant observation and separated myself from the participants that I studied. The interpretive approach seeks to understand and focus on specific and concrete contexts.

4.2.3 Interpretivism

Interpretivism is concerned with the factors related to a context, and it values people as they provide a deep understanding of the phenomenon and its complexity in its unique context instead of generalising this to an understanding for the whole population (Saunders, Lewis and Thornhill 2012; Saunders, Kitzinger and Kitzinger 2015; Creswell and Poth 2016). Hence, (Ryan 2018) argues that researchers cannot be completely separated from their values and beliefs, which inform data-generating, interpretation and analysis (Alharahsheh and Pius 2020). In this study, interpretivism promotes multiple interpretations of events without bias. Furthermore, interpretivism provides a deeper understanding of the social context (Pham 2018). Therefore, the research was conducted in a natural setting using a case study to understand the authentic experiences that TVET lecturers had learnt during WIL.

Interpretivism allows for the use of interviews to interrogate and prompt issues beyond observation. I probed the interviewee's thoughts, feelings, and perceptions (Alharahsheh and Pius 2020). Therefore, the generated data anchors insights for further action.

4.2.4 Methodology and axiology

Methodology[1] is explained as the theory of knowledge and how we come to know practically (Mukeredzi 2009). Edelheim (2014) refers to methodology as the study of methods and processes, enabling me to answer the research question. Methodology, in my research context, refers to methods and techniques I employed, such as face-to-face interviews and non-participant observation. Crotty (1998) supports my suggestion that methodology is a strategy of action behind the choice and use of certain methods. The methodology aims to define, assess and substantiate the use of these particular research methods. The techniques helped to understand the phenomenon: the nature of TVET lecturers learning through WIL. Axiology refers to the research aims and attempts to clarify what I seek to explain or understand (Saunders, Lewis and Thornhill 2012). Axiology generally refers to the role of values, biases, assumptions, ethical approaches and considerations. In my study, a case study[2] was employed.

4.3 RESEARCH APPROACH

The study employed a qualitative approach. Qualitative research is framed using words or open-ended questions in questionnaires and interview questions (Creswell and Poth 2016). In other words, qualitative research generates and analyses non-numerical data, like text, photos or audio. Denzin and Lincoln (2018) posit that qualitative researchers study things in their natural settings and interpret phenomena regarding people's meanings and experiences.

This study strives to understand TVET lecturers learning during WIL in a social context. I followed the lecturers in their natural settings – in industries to find out how and what they learnt and the conceptions of their learning during WIL. Non-participant observation and interviews were used as data generation strategies to find answers to 'what and how' TVET lecturers learnt in the industry during WIL. The approach is flexible because it makes the

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[1]Methodology is a strategy, plan of action, process or design lying behind the choice and use of particular methods and linking the choice and use of the methods to the desired outcomes (Crotty, 2003: 3).
[2]Cohen (2000) says that case studies provide a unique example of people in real situations, enabling the understanding of ideas more clearly than simply presenting them with abstract theories.

necessary modifications to improve my research instruments and data generation. Crucial to qualitative research design is its flexibility, which enabled the modification of inquiry direction from ongoing experiences during data generation and reflection on the generated data (Henning, Van Rensburg and Smit 2005). The process enabled some modifications to the data generation instrument (interview schedule) after my initial interview. Strauss and Corbin (1998) stress that qualitative researchers value different data generation approaches. I followed-up on the data I had already generated to achieve deeper insights and clarify grey areas. After realising that it was asking for the same response I had already received, I had to leave out a question. I also changed appointment dates and times to suit the availability of participants who had commitments that clashed with our initially agreed times. The research design is discussed next.

4.4 RESEARCH DESIGN

The research design serves as a master plan and structure to execute the research to maximise the findings (Mouton, Auriacombe and Lutabingwa 2006). The research design suggests how to generate data, what instruments were employed, how the instruments were used and the means for data analysis. A case study is an in-depth analysis of a single entity that aims to explore to understand it in detail (McMillan and Schumacher 2010; Creswell 2013). The characteristic feature of case study design is that it enables rich-thick descriptions of the participants' lived experiences, feelings and thoughts (Cohen, Manion and Morrison 2017). This study enabled detailed thick descriptions of real-life events of lecturers' industry experiences and circumstances during WIL. The case study gave me a chance to focus on specific cases of interest where the data to be generated is expected to be richer and of greater depth than can be found through other designs. Shuttleworth and Wilson (2008) argue that a case study provides more realistic responses than a purely statistical survey. I adopted a multiple case study design. A multiple case study helped to understand the similarities and differences between the cases (Creswell 2013; Gustafsson 2017).

My study was carried out in three TVET colleges in KZN province, justifying the use of a multiple case study. Yin (2003) argues that the relatively small sample size, whether 3 or 10 cases are used, does not transform the case's trustworthiness. I used multiple cases to understand the similarities and differences between these cases. The evidence produced from a multiple case study is robust and reliable, enabling me to clarify the validity of the results (Gustafsson 2017). In the three cases in KZN province, I focused on three different mechanical, electrical, and civil programmes to obtain cross programme comparisons. Yin (2003) agreed that multiple case studies could be used to either predict similar or contrasting results. My study aims to replicate, contrast and confirm findings across cases. Several cases are examined in a multiple case study to understand their similarities and differences (Baxter and Jack 2008). The evidence created from a multiple case study is considered strong and reliable, but it can also be time-wasting and costly to conduct (Baxter and Jack 2008).

4.5 STUDY POPULATION

The population is defined as the entire group of people (participants) with one or more similar characteristics from whom information is required (Wiid and Diggines 2013). Punch (2009) describes the population as a target group which cannot be studied directly; hence, a sample from that population is taken. The population, therefore, is a group of people with some common features. This study involves a population that cannot be reached in its entirety. Therefore, not every TVET lecturer in South Africa could participate. This study's population was lecturers in the three TVET colleges on WIL or those who completed WIL in KZN province. The total population of TVET lecturers in South Africa stood at 10 504 in 2015 (Department of Higher Education and Training 2017a, 2017b). Six months after their completion of WIL, lecturers were identified to capture their detailed experiences while they still remember. The similar characteristics are that they are TVET lecturers who are eligible to go on WIL. The industry personnel hosting the lecturers on WIL formed part of the population.

4.6 SELECTING PARTICIPANTS

Sampling is defined by Taherdoost (2016) as a process of selecting a part of the population for study. Leedy and Ormrod (2015) posit that qualitative researchers are intentionally non-random in their choice of data sources as their sampling is purposeful. Conversely, du Plooy-Cilliers, Davis and Bezuidenhout (2014: 134): argue that: "A sample is a subset of a population that is representative of the population". Therefore, sampling entails selecting participants who wield rich data in research. My sampling technique was a non-probability sampling design: convenience and purposive sampling because I identified available participants according to their location, availability and engagement in WIL. Purposive and convenience sampling were used to select lecturers and company personnel, respectively. These sampling designs do not offer all population elements equal opportunities of being selected like probability sampling (Cohen *et al.* 2011) and are often used in studies that seek subjective data (Maree 2012). Therefore, they are appropriate for my study. The interpretive paradigm, multiple case study, qualitative approach, and interviews all focus on subjective data that I sought to generate from TVET lecturers since it was based on participants' opinions on industrial experiences. The sampling methods are explained below.

4.6.1 Convenience sampling

Convenience sampling is non-random or non-probability sampling where members of the target population, as noted by Cohen, Manion and Morrison (2017), are chosen for a study if they fulfil some particular practical criteria. The criteria can be geographical proximity, availability at a particular time, easy accessibility or willingness to participate in the study. I considered the availability and willingness to participate in my study. In this instance, I selected the method on proximity and affordability as I work at one of the TVET colleges in KwaZulu-Natal Province. According to Maree (2012: 177), convenience sampling refers to "situations when population elements are selected based on the fact that they are easily and conveniently available". Convenience sampling (also called availability sampling) is selected based on being accessible or expedient (McMillan and Schumacher 2010). The other two TVET colleges are also easily accessible. Thus, convenience sampling in this study was used to sample the three TVET colleges. Purposive sampling is explained next.

4.6.2 Purposive sampling

Maree (2012) says purposive sampling means participants are chosen due to some important qualities that qualify them as potential rich holders of the study data. Similarly, Etikan, Musa and Alkassim (2016) concur that purposive sampling is the deliberate choice of informants due to their qualities, knowledge, and skills. In qualitative research, the reasoning of selection is grounded in the value of information-rich cases where this is not available through a random sampling technique. Mesuwini and Thaba-Nkadimene (2021) support that purposive sampling seeks information-rich cases that can be studied in a great deal about issues of central importance to the purpose of my research. From this perspective, purposeful selection is an approach for accessing appropriate data that "fit the purpose of the study, the resources available, the questions being asked, and the constraints being faced" (Patton 2002: 242). It suggests purposive sampling can play a pivotal role in selecting participants with core experience and valuable input. Table 2 below shows the study participants.

Table 2: The study participants

	Lecturers on WIL			Lecturers who completed WIL			Industry personnel		
Number of Participants	Civil	Electrical	Mechanical	Civil	Electrical	Mechanical	Training Manager	Foreman	Training Officer
	3	3	3	3	3	3	3	3	3
Total per category	9			9			9		
Total participants					27				

Source: Designed by author from the planned research participant numbers.

Notes: The table above shows the total number of study participants (lecturers and company personnel) and their areas of specialisation. The total number of participants for the study was twenty-seven (18 TVET lecturers and 9 industry personnel).

The number of companies involved was a minimum of three and a maximum of ten. Of all the lecturers on WIL at each purposively sampled college as indicated in the above table, nine lecturers who completed WIL in 2017 were identified since they still had vivid memories about their WIL experiences. The suitability for participants' inclusion in the study was restricted to at least six months after completing WIL. I sampled a minimum of nine lecturers currently on WIL training with at least six months and a maximum of 12 lecturers assuming that they would have gained some industry experience. This selection helped build up a sufficient sample to generate data to achieve data saturation in the study. I took three lecturers on WIL from each of the three engineering programmes (mechanical, electrical and civil) that I sampled since a maximum of four lecturers are often sent on WIL due to staffing restrictions. The different programmes helped me to understand how and what lecturers learn in their different trades. Three industry personnel per host company were included in the study. They were always hands-on in industry and provided their viewpoint on the lecturer's learning from their knowledge and experience. Purposive sampling was used to choose a specific number (18) of participants, as indicated in the research design, who, by my judgment, met the specific purpose of the study (Cohen, Manion and Morrison 2017). Purposive sampling focused on characteristics of the TVET lecturer population of interest, which enabled answering my research questions.

4.7 PILOTING

Pilot testing means pre-testing research instruments before the actual process takes place. There are unexpected complexities, twists and turns that deserve investigation before falling speedily into the thick of the enquiry (Seidman 2013). A pilot study refers to a small-scale trial run preparing for a major study (Polit and Hungler 1997; Baird 1999; Flick 2018). Therefore, piloting tests the instrument to check for any possible flaws before going to generate research data. The pilot study could improve and avoid costly mistakes (Hungler, Beck and Polit 1997). The pilot can also provide the context of the phenomenon under study. In this instance, the pilot interviewed some colleagues in my college, but they were not part of my final sample in the study even though their results were included in the research findings and analysed together. I used lecturers who went on WBE for piloting the instruments since they had an idea on WIL. Piloting helped obtain insights into the technical fundamentals that did not clearly express the critical question (Seidman 2013). It is essential to test the instrument to ensure that the questions are appropriate, clear to participants, and there is no ambiguity with the wording.

The feedback from the piloting phase served to:

- Increase clarity in the language;
- Assess the user-friendliness of the instrument;
- Use comments to improve the sequence of questions.

Feedback from the pilot helped to improve the wording of questions as it emerged that some of the responses from different questions were similar. Some questions were rearranged to maintain the flow of the discussion. Therefore, the pilot test checked whether the questions generate appropriate data and are within the set timeframes of 45 minutes to an hour. Participants' reactions to the questions are crucial. They helped to make necessary changes to avoid repetitiveness or redundancy. Five lecturers were selected for the pilot study. Piloting allows consulting and sharing the best research practices with peers to finalise a perfect instrument for the field. This experience enables the revision and refinement of the data generation approach, thereby enhancing rigour (Creswell and Poth 2016).

4.8 DATA GENERATION

There are various procedures for generating data, including questionnaires, interviews, classroom observations, diaries, journals and many more. However, I used face-to-face semi-structured interviews, which were voice-recorded, as well as non-participant observation. Both a cell phone and laptop were used to voice-record the interview. The laptop served as a backup to the cell phone. These instruments are suitable for generating qualitative data in line with my research paradigm, design and approach. Using interviews and non-participant observation to generate data provided an opportunity for data triangulation, which could address possible shortfalls deep-rooted in a single method approach and then provide opportunities to test the trustworthiness and dependability of research findings (Johnson and Onwuegbuzie 2004). The instruments that I used to generate data are discussed below.

4.8.1 Interviews

The interview is one of the methods used to generate data from participants. Most qualitative researchers use interviews to reach areas of reality that would otherwise remain inaccessible, such as people's subjective experiences and attitudes (Crawford and Johns 2018). Face-to-face interview was used on 18 TVET lecturers. An interview requires the participant to answer a set of predetermined semi-structured questions (Nieuwenhuis 2015). A semi-structured interview schedule was used to guide the lecturer and industry personnel interviews. The interview schedule was prepared by framing questions from each of the three research questions. Hence, questions were divided into three sections covering each research question. Questions were kept short and simple. O'Leary (2005) defines an interview as a data-generating method that involves seeking open-ended answers to several questions.

An interview is a two-way discussion where the interviewer enquires about the participant's experiences, beliefs, views, opinions, behaviours and uses an extensive probe and follow-up questions where the participant gives ambiguous answers (McMillan and Schumacher 2010; Maree 2012). The interview allowed the participants to air their views. The interview allowed probing the participants' responses to generate rich data. I named each recording to keep a clear record of the audiotapes. Transcription of the recorded tapes was done soon after the interview, while the process was still echoing in my ears. The transcribed notes were taken to the respective participants for verification where clarification was required.

Maree (2012) advises that a researcher must be attentive to the participants' responses to identify new emerging lines of inquiry directly related to the studied phenomenon. Further to that, Bryman (2012) warned that I should ensure that the setting for an interview is not too noisy and the participant is assured of privacy when answering questions. The interview sequence may be different for every participant, depending on the interview process and how each participant responds to questions (Chilisa and Preece 2005). Attentiveness was achieved by using audio recording devices to give more attention to the participants rather than writing notes. Stringer (2008) agrees that voice recording allowed me to acquire a detailed and accurate interview account. However, Bryman (2012) cautions that a good quality recording machine should be used when interviewing participants to ensure clarity when transcribing and capturing information. Also, participants develop comfort (Stringer 2008) when they realise that their views are not distorted over time.

Neuman (2012) says that face-to-face interviews have the highest response rates and permit non-verbal communication and visual aids. I allowed space for the narrative to develop, holding back some questions until the participant had answered the questions sufficiently. The length of the interview was between 45 minutes to one hour, depending on the participant's responses. Seidman (2006) says an hour carries with it the consciousness of a standard unit of time that participants can afford, while two hours is apparently too long to sit at one time.

The interview items asked about the nature of TVET lecturers' learning and the kinds of knowledge they gained during WIL. Some follow-up questions were asked to see if lecturers gained additional knowledge or had adopted other learning methods, which helped confirm the internal consistency of participants' responses. The interview venues were scheduled as agreed with the interviewees to remain comfortable in a relaxed and receptive frame of mind. While interviewing requires a highly trained and proficient interviewer, I tried to match it by being courteous, handling participants with respect and integrity and maintaining confidentiality, as elaborated under ethical issues in this chapter's last section. My data generation procedure was as follows:

1). I obtained a clearance letter from the Durban University of Technology (DUT) Institutional Research Ethics Committee (IREC).
2). After finalising the appointment and meeting with the participant, I introduced myself, explained my study's purpose as per the consent letter, and signed it before commencing the interview.

3). The interview started using the schedule (see Annexure 12) and voice recording.
4). Each recording was transcribed immediately after the interview.

There were challenges in accessing industry personnel during the data generating process as they shifted appointment dates due to work commitments. I also received gatekeepers late from college principals who also delayed my planned interview schedule. To circumvent this challenge, I liaised with the Training Managers and the DHET provincial office, who helped facilitate the appointment meetings. The delay affected my financial resources, as I had to travel more than planned. Overall, there was no impact on the findings.

4.8.2 Observation

To make my findings robust, I used non-participant observation, which involves observing participants using an observation checklist (see Annexure 13). Baker and Edwards (2012) support that interviews alone are an insufficient form of data generating. Non-participant observation can capture social action and interaction as it occurs, even though it relies on the observer's selective subjectivity who chooses both what to observe and what to record in a complex social interaction (Caldwell and Atwal 2005). Non-participant observation also allowed me to capture data that might have gone unnoticed during the interviews (Wagner 2006). The data assisted in triangulating the interview data. I was able to see activities such as using machinery, safety procedures, communication amongst employees, teamwork, punctuality, willingness to execute assigned duties, participants' facial expressions and lighting. McMillan and Schumacher (2010) state that observation is how one sees and hears what occurs naturally in the research site. The aim was to explore and understand what the TVET lecturers were doing in the industry when working in their respective trades. Marshall and Rossman (2011) describe observation as a fundamental and very important technique in qualitative inquiry. I observed 18 TVET lecturers on WIL.

While some of the study participants are colleagues from my TVET College, where I am employed as a lecturer, I minimised bias by having clear procedures and rules for the ensuing observation. Furthermore, I maintained a neutral stance avoiding any prior knowledge, opinions, values and subjective feelings. Traniello and Bakker (2015) concur that research results should not be influenced by the researcher's expectations, who may intentionally score outcomes to favour a theory or preconceived ideas. As such, I captured everything said by the participants, maintained an open mind, and allowed data analysis to filter and acquire meaningful insights from the data. The observation lasted the whole day to see all daily routine duties. Regardless of the period, Liu *et al.* (2010) suggest that observation should end when theoretical saturation is reached when further observations begin to add little or nothing to researchers' understanding. After generating data, a thematic data analysis process ensued.

4.9 DATA ANALYSIS

Qualitative data analysis is explained as an inductive procedure of organising data into categories and identifying patterns and relationships among the categories and asking questions about those patterns (McMillan and Schumacher 2010; Maree 2012). Similarly, Mouton, Auriacombe and Lutabingwa (2006) explain data analysis as breaking up data into manageable themes, patterns, trends and relationships. I adopted an open manual coding where I sorted data according to each question. I familiarised myself with data by repeatedly reading the transcripts and checking if all codes were captured, deleting, shuffling and changing as I found appropriate. I also listened to audiotapes, where I picked some important points that I had not captured. My research supervisor assisted in identifying suitable themes. Some of the themes were induction and mentoring, learning from practice, learning from meetings and teamwork. The following steps of thematic data analysis were followed:

- In-field data analysis – inductive analysis to identify patterns.
- Transcribing the voice-recorded tapes.
- Organising and indexing data.
- Coding – deductive analysis.
- Developing themes.
- Exploring/juxtaposing the relationships among the different themes and developing an interpretation of meaning.

Lastly, I developed an interpretation of the data's meaning as posited by Maquire and Delahunt (2017). To report the findings, I selected quotes, from transcripts, that represented each theme and ensured representation across participants so that their learning through WIL was described in their own words (Mukeredzi 2020). The findings were supported by relevant literature. I achieved trustworthiness by going back to the participants to verify the meaning of their transcripts. Further details about my research trustworthiness are explained below in the following four aspects: credibility, transferability, dependability and confirmability. Rigour was enhanced through trustworthiness.

4.10 QUALITY ISSUES

4.10.1 Trustworthiness

In qualitative research discourse, trustworthiness can be established using these four strategies: credibility, transferability, dependability and conformability (Krefting 1991; Creswell 2013). Credibility, transferability, confirmability and dependability are used to pursue a trustworthy study (Guba and Lincoln 1994; Graneheim and Lundman 2004; Shenton 2004). There are matters of honesty, depth, richness, the scope of data, nature of participants, triangulation, and researcher interest, which are vital to addressing trustworthiness in qualitative research (Guba and Lincoln 1994). Trustworthiness helps avoid bias and strengthen some viewpoints, which can be caused by individual selective perception.

As a non-participant observer, I used an observation guide and wrote field notes to record what I saw and heard and reflections on what occurred. Stinchcombe (2020) asserts that you can find distinctions among phenomena when you cast the net wide. Data generating was achieved by using interviews and observations. When generating data, trustworthiness is confirmed through member checking of the raw transcriptions and changed by participants where necessary (Cohen, Manion and Morrison 2017). I allowed participants to read the summaries of categories and themes during the follow-up session. I observed the four categories of trustworthiness, which I discuss in the following section. The first aspect is credibility.

4.10.2 Credibility

Any research's credibility is obtained by a detailed "rich-thick" description of the setting, participants, and themes that emerge (Creswell 2013). To promote credibility, I provided detailed, in-depth descriptions of the setting, participants and themes that arose from the data. Credibility refers to the accuracy with which I interpret the data that participants provided. According to Rose and Johnson (2020) the researcher's credibility is especially vital in qualitative research as the researcher is the primary instrument of data generation and analysis. Credibility is, therefore, the correspondence between how I generated, interpreted, and presented the research findings and the research participants' meanings and perspectives

(Merriam and Grenier 2019). Shenton (2004) says that participants should be encouraged to be honest from the outset of each session, with the researcher targeting to establish a rapport in the opening moments and indicating no wrong responses to the question asked. At the same time, Krefting (1991) says that credibility requires enough submersion into the research setting to allow recurring patterns to be identified and verified. In this way, participants were free to share their WIL experiences.

I took transcribed data to participants to check what I had recorded, and they were in agreement with my presentation as their initial submission. Consequently, including member checking into the results and gaining feedback on the participants' interpretations and conclusions increases credibility. Guba and Lincoln (1994: 314) contemplate member checking into the findings as "the most critical technique for establishing credibility". Therefore, credibility is assessed if the conclusions were derived from the generated data. I did not, at any stage of the research, falsify any information. du Plooy-Cilliers, Davis and Bezuidenhout (2014) explain that falsifying information occurs when one intentionally fabricates or alters data to get the desired outcome or avoid difficult, time-consuming aspects of data generating and analysis. The generalisation of findings was discussed through transferability.

4.10.3 Transferability

Transferability is a concept used to determine how findings can be generalised in qualitative research (Rolfe 2006). Seale (1999) believes that transferability is achieved by providing a detailed, rich description of the settings to provide sufficient information to judge the findings' applicability to other settings. In this study, transferability was achieved by providing thick descriptions of the research sites. A comprehensive description of the context in which data was generated is provided in the fifth chapter. Yin Yin (2003) supports that triangulation can be used to confirm the process's trustworthiness in case studies by using multiple data sources. Anney (2014) posits that triangulation helps to reduce systematic bias and cross-examine the integrity of participants' responses. To minimise bias, I used notes to guide me through data generating to focus on my study's essential aspects.

Furthermore, I provided a detailed research methodology and assumptions underlying the study. Bourke (2014) suggests writing my thoughts against the interaction to avoid losing critical participant reactions. Also, Cohen *et al.* (2011) put forward that triangulation helps compensate for one data-generating technique with a different approach. I used lecturers and industry personnel as data sources and used interviews and non-participant observations to draw the data. Bless, Higson-Smith and Sithole (2015) conclude that a study can have high transferability when the context from which findings emerge is understood deeply. Several other contexts where such findings might be meaningful can be imagined.

4.10.3 Dependability

Dependability is achieved in qualitative research through periodic feedback and continuous information generating (Driessen *et al.* 2005). Dependability would be achieved if the same results would emerge after repeating the same study in the same context and employing similar methods (Shenton 2004; Merriam and Grenier 2019). Peer debriefing enhances the research's accuracy by peers who review and ask questions about the study (Creswell 2013). My supervisors were of great help in providing scholarly insights, guidance and constructive comments through the journey. The validation of findings is discussed under confirmability.

4.10.4 Confirmability

Confirmability involves applying various methods in a study so that data, results or phenomena confirm one another (Cutcliffe and McKenna 1999). Miles and Huberman (1994) consider that a critical criterion for confirmability is the extent to which the researcher admits his or her predispositions. In agreement, Shenton (2004) cautions that I should ensure that research findings come from participants' data. From these definitions, it can be deduced that confirmability is how the research findings can be corroborated or validated by others. I achieved confirmability through member checking, where participants confirmed verbatim transcriptions. My reporting of data and results was honest, without fabricating, falsifying, or misrepresenting it. The research findings were archived according to DUT policy and could be made available to those granted permission to verify them. The process that I followed was also clarified for other researchers to understand the context of my research and see whether they will replicate my research in other contexts. A discussion on triangulation followed.

4.10.5 Triangulation

Triangulation is a way of checking out the consistency of multiple data sources by comparing and cross-checking the consistency of information derived at different times (Yin 2003; Yin 2011; Denzin and Lincoln 2018). Triangulation is a way of sourcing information from multiple sources to corroborate, elaborate, or illuminate the research problem and its outcomes (Cohen, Manion and Morrison 2017). Triangulation increases credibility and checks dependability by sourcing information from different sources to form themes for the study. The triangulation process enabled me to clarify meaning by identifying the different ways in which participants perceived WIL. I used different data generating techniques (face-to-face interviews and non-participant observation) to get multiple perspectives on the same issue and better understand WIL. Anney (2014) recommends that qualitative research must include at least two data generating techniques. Following this recommendation, I used face-to-face interviews and non-participant observation as data generating techniques.

Triangulation incorporates multiple data sources to increase confidence in the research findings (Creswell 2013). Triangulation is often cited as one of the leading ways of authenticating qualitative research evidence. Borkan (1999) explains that immersion can achieve triangulation, where the researcher dips into the generated data and reads or scrutinises some portion of the data in detail. Therefore, triangulation can be an effective approach used to evaluate the outcome of my study. The limitation of the study is outlined next.

4.11 LIMITATIONS OF THE STUDY

The study is limited to TVET colleges in KwaZulu-Natal, including Majuba TVET College, assuming that colleges' general set-up is the same. Leedy and Ormrod (2005: 135) state: "Sometimes researchers focus on a single case, perhaps because its unique or exceptional equalities can promote understanding or inform practice for similar situations". The sample used is small, whose results may not be generalised to the whole population. However, Neuman (2012) supports that the researcher may generate a large amount of information on a few cases, go into greater depth, and get more details on the examined cases. In this notion, McMillan and Schumacher (2010) describe this case study as an instrumental case that provides an insight into a specific theme or issue with an in-depth understanding of the single phenomenon.

The potential participants were approached earlier about my intention to use them in the research. Some of them are long-serving colleagues in the TVET College sector who contributed positively through their long service experience. I was alert to the lecturers known to me who may want to subvert the exercise. Participants' comprehension of the

English language was a barrier as experience with colleagues has shown that they generally struggle to express themselves in proper English. To restrain this challenge, I simplified sentence construction and used simple words, which were easy to understand after getting an indication from the pilot study. The lack of research knowledge from participants limited the process flow as some participants experienced this exercise for the first time. Some misconstrued the research interview as a way to be exposed and were shy from taking part. I had to visit some and called others to explain that their participation would not jeopardise their employment status in any way. Research behaviour is discussed under ethical issues.

Throughout the doctoral journey, I lost three laptops, two of which were through software bugs. This was quite a drawback to my journey. I experienced a further delay in completing my studies by changing supervisors after four years of slow progress. The changeover process took about six months to complete. My challenges were coupled with my failure to claim funding from the DUT research fund due to unclear claiming procedures. However, Zakumi Consulting Engineers (Pty) Ltd came to my rescue, as acknowledged at the beginning of the thesis.

As the discussion indicates below, several ethical issues informed data generation and analysis in my study.

4.12 ETHICAL ISSUES

Ethics[3] define what is or what is not legitimate to do in research (Neuman 2012). Ethics refer to acceptable and unacceptable behaviour in research. Burton and Bartlett (2009) state that ethics should be the principal consideration for all education researchers, while Punch (2009) says that ethics involve gathering data from people about people. My obligation as a researcher was to protect participants, develop trust with them, promote research integrity, and guard against misconduct and impropriety that might reflect their organisations or institutions (Creswell 2013). In this regard, Cohen, Manion and Morrison (2017) comment that the essence of confidentiality and anonymity is that participants' information should in no way reveal their identity. In this view, I used pseudo names for all participants to ensure their

[3] Chilisa (2005) highlights research ethics saying that ethical issues include codes of conduct that are concerned with protecting the participants from physical, mental, or psychological harm.

confidentiality, anonymity and non-traceability in this research. The confidentiality of data generated from research participants was maintained by ensuring that only my supervisors and myself had access to participant responses and avoided anyone outside of the research from linking participants with their responses. Denscombe (2014) cautioned that information that I received from participants during the investigation should be treated with confidentiality because research can have potentially harmful effects if conducted without careful consideration. The ethical principles were applied throughout my research process, exercising honesty and openness by not fabricating, falsifying, or misrepresenting data, and maintaining participants' privacy. The participants were able to access the findings upon their request.

All the data is kept locked up by my supervisors for five years, after which it shall be shredded. Ethical consideration is essential to prevent loss of dignity, harm and risk, privacy, self-esteem and independence of the participants (Shamoo and Resnik 2009). I was considerate and professional and allowed them to set convenient dates, avoid unnecessary extensions, and keep participants in discomfort. I applied for ethical clearance from DUT as Denscombe (2014) recommended that it is becoming increasingly common for researchers to apply for approval from a research committee before carrying out the research. The research committee Institutional Research Ethics Committee (IREC) verified if the research ethics principles were strictly adhered to in PG2a form and gave a green light for the fieldwork through an ethical clearance letter. However, the responsibility for the ethical conduct of research rests with me. I sought permission from DHET and college principals (Refer to Annexure 1, 2 and 3) to research the nearest three TVET colleges in northern KZN province. Bell (2014) and Patel, Doku and Tennakoon (2003) recommend that researchers seek permission before researching a target community. I gave all participants information letters and consent forms (Refer to Annexure 4 and 5) to confirm their willingness to participate in the research. Annexure 8 and 9 were also availed to participants who asked for proof of permission to conduct research. Maree (2012) supports that students or researchers conducting research need to apply and obtain ethical clearance from responsible persons in authority. The participants were notified of voluntary participation, without coercion, and the right to withdraw from the study at any stage. Any travelling costs that participants incurred in the process of the interviews were refunded in full. The chapter is concluded below.

4.13 CHAPTER SUMMARY

The chapter discussed the research paradigm in detail, research design used in the study, research approach, sampling methods, data generation tools, data analysis methods, ethical considerations and trustworthiness issues. This chapter shows how the study is conducted while all the concepts of qualitative research are fully explained. The research design for this study is an interpretive case study design that used qualitative research instruments.

The next chapter relates to the research sites where my participants were selected and explains their location and context.

CHAPTER 5: RESEARCH SITES AND PARTICIPANT PROFILING

5.1 INTRODUCTION

The purpose of the study was to explore TVET lecturers learning through WIL, establish the nature of their learning, the kinds of knowledge that they gain and determine how the lecturers understand their learning. The previous chapter explained and justified in detail the methodology used to answer the research questions. Through this case study, an in-depth analysis of purposively selected WIL lecturers provided an inauguration in their different social settings. I visited different social settings of the cases to generate data using face-to-face semi-structured interviews and non-participant observations following appropriate ethical considerations. The interview schedule was piloted with five lecturers who were not part of the study. It is important to pilot the instrument to ensure that questions are appropriate, clear to participants, and there is no ambiguity with wording. Therefore, the pilot test allowed me to check whether the questions generated appropriate data and were within the set timeframes of 45 minutes to an hour. Participants' reactions to the questions were instrumental in making necessary changes to avoid repetitiveness or redundancy. Baird (1999) describes a pilot study as a trial run to prepare for a major study. From the chapter, the process of thematic data analysis was fully outlined.

This chapter presents the participants' profiling and further explains the setting in which I conducted the study. The study focused on KwaZulu-Natal province with specific reference to Amajuba, UMzinyathi, Zululand, UThukela and UMgungundlovu Districts. The study was extended to the last two districts listed immediately above due to non-availability of participants. A geographical description of the sites is presented below, providing an understanding of the context from where data is generated. This chapter proffers a brief history and development of TVET programmes, teacher education programmes, policy context, broad TVET college contexts, college contexts, study participants in that setting and company contexts study participants in that setting.

5.2 PARTICIPANTS' PROFILING

The participants for this study were purposively and conveniently selected. These profiles played a significant role in understanding participants' achievements, challenges and realities, which could influence data generation. Therefore, issues of age, gender and qualifications were considered important. The following chart shows the gender orientation of the participants that assisted the researcher to employ appropriate steps to generate data (Loderer *et al.* 2020).

5.2.1 Gender

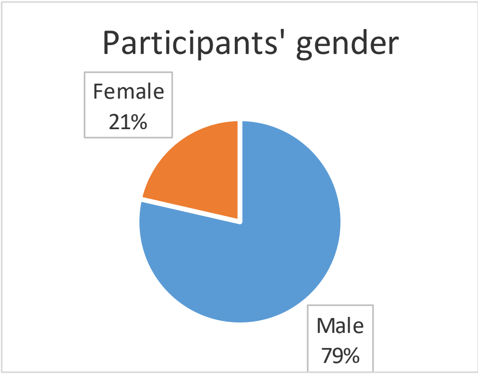

Figure 8: Participants' gender

Source: Designed by the author from participants' gender orientation data.

Notes: The data presented in the pie chart above reflects the number of participants and their gender. It shows that of the 27 study participants, 79% (22) were male against 21% (6) female participants.

Of the six female participants, none was part of company personnel. They were all TVET lecturers from mechanical, electrical and civil engineering disciplines. It emerges clearly that the trade courses are still male-dominated, judging from the above data. The age groups of the participants are shown below.

5.2.2 Age group

The ages of all participants were recorded as shown in the chart below. The participant ages were sorted in ascending order so that the age differences could be noted.

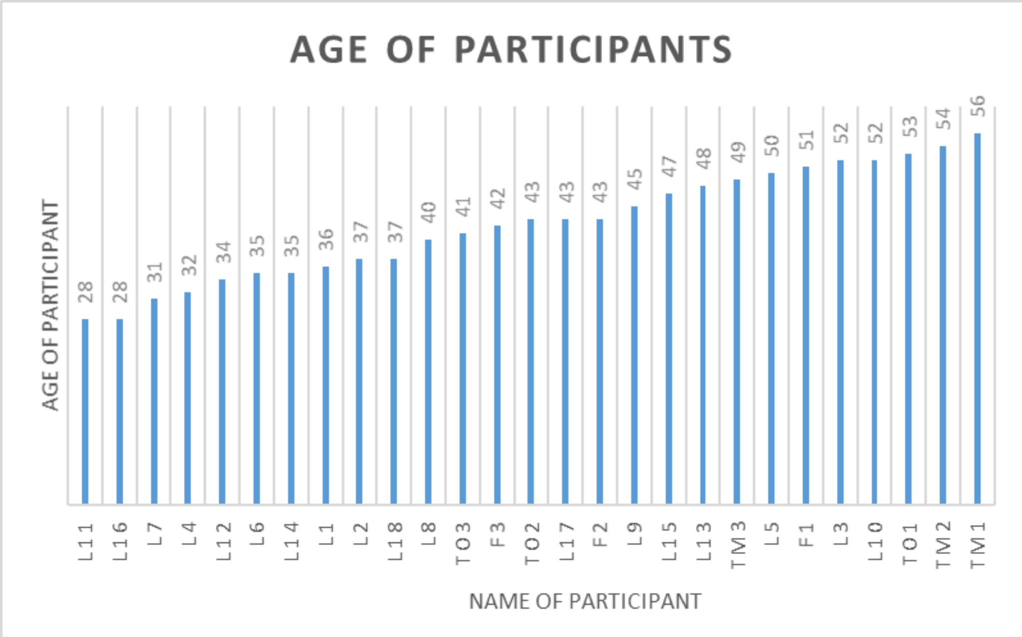

Figure 9: ***Age of Participants***

Source: Designed by author from participant ages.

Notes: **Figure 9** above shows the ages of the participants. Lecturers were labelled as L1-L18; Foremen as F1-F3; Training Officers as TO1-TO3, and Training Managers as TM1-TM3. Lecturer 11's age was half that of Training Manager 1, which reflected an inexperienced lecturer versus well-experienced industry personnel.

It was noted that eleven lecturers were between 28 and forty years, while only three fell between 50 and 60 years. Most of the lecturers sampled were relatively young, which suggested that they were novices in the TVET education sector.

5.2.3 Qualifications

The qualifications profile of participants was generated, even though some participants (particularly industry personnel) were unwilling to divulge their qualifications. Sim and Waterfield (2019) support the emotional capacity of the participant to give or withhold consent without coercion. The fulfilment of this ethical element validates informed consent to carry its intended moral force (Sim 2010). The following table shows the qualifications indicated by participants.

Table 3: Participant Qualifications

	Type of qualification							
Participant	**Trade Test**	**NPDE**	**National Diploma**	**Bed**	**BTech**	**Honours**	**Masters**	**Other**
Lecturer 1	□	□	□					
Lecturer 2			□		□	□	□	□
Lecturer 3	□	□	□					
Lecturer 4	□	□	□					
Lecturer 5	□		□					
Lecturer 6	□	□	□					
Lecturer 7	□	□	□					
Lecturer 8	□	□	□					
Lecturer 9	□	□	□			□		
Lecturer 10	□	□						□
Lecturer 11	□	□	□			□		
Lecturer 12			□					
Lecturer 13	□	□	□					
Lecturer 14	□	□	□		□	□		
Lecturer 15	□			□		□	□	
Lecturer 16		□	□					
Lecturer 17	□		□					
Lecturer 18		□	□					
Foreman 1	□		□					
Foreman 2	□							□
Foreman 3	□		□					□
Training Officer 1	□	□	□					
Training Officer 2	□		□			□		□
Training Officer 3	□		□			□		
Training Manager 1	□							
Training Manager 2	□							
Training Manager 3					□			

Source: Designed by the author from participant qualifications profile.

Notes: The participant qualifications were collated and displayed in **Table 3**. Some participants were not keen to provide their qualifications. Due to ethical issues, they were not probed. Hence, there were some gaps against their pseudo-names.

Most of the TVET lecturers acquired a trade test through WIL. The table shows that most lecturers possessed a national diploma in their respective discipline. Due to the nature of their jobs, it emerged that most did not attempt further studies. The industry personnel, particularly Training Managers, did not possess qualifications beyond a trade certificate, though it could not be probed to respect the dignity of the participants.

5.2.4 Job designation

The TVET lecturers were described as student lecturers or trainees. They were learning industry skills during WIL. There were key role players involved in the WIL like Training Managers, Training Officers and Foremen. Most of the industry personnel were artisans with vast industry exposure. Their duties included guiding TVET lecturers learning during WIL to ensure that they covered adequate practical competencies as prescribed in their logbooks.

5.2.5 Work experience in the Industry

The industry personnel have a fundamental role in ensuring that company production processes flow as scheduled. In the process, TVET lecturers learning during WIL benefited from the practical processes and procedures. Besides practical skills, TVET lecturers learning during WIL could also learn from observing the processes and sharing from meetings and other communication channels. Industry work experience involves using machines and equipment, following strict procedures and being part of a winning team. The study shows whether lecturers gained work experience during WIL.

5.2.6 Teaching experience in TVET College

All TVET lecturers engaged in WIL had some teaching roles at their respective TVET colleges in the civil, electrical or mechanical engineering discipline. Since TVET Colleges have a mandate to train work-ready graduates, the teaching experience of lecturers seemed to be short of adequate practical experience. Therefore, this study sought to find out what skills were learnt in the industry during WIL. Other studies may yet determine whether WIL improved the teaching experience in TVET Colleges.

5.3 RESEARCH SITE

The map provided in **Figure 10** below (see pp. 113) shows the study area to which the research was restricted. It stretched from Amajuba to the uMgungundlovu District. The main reason for stretching far was that the participants were not available in some nearby TVET colleges. Hence, I had to go further and select them purposively, as described in the previous chapter.

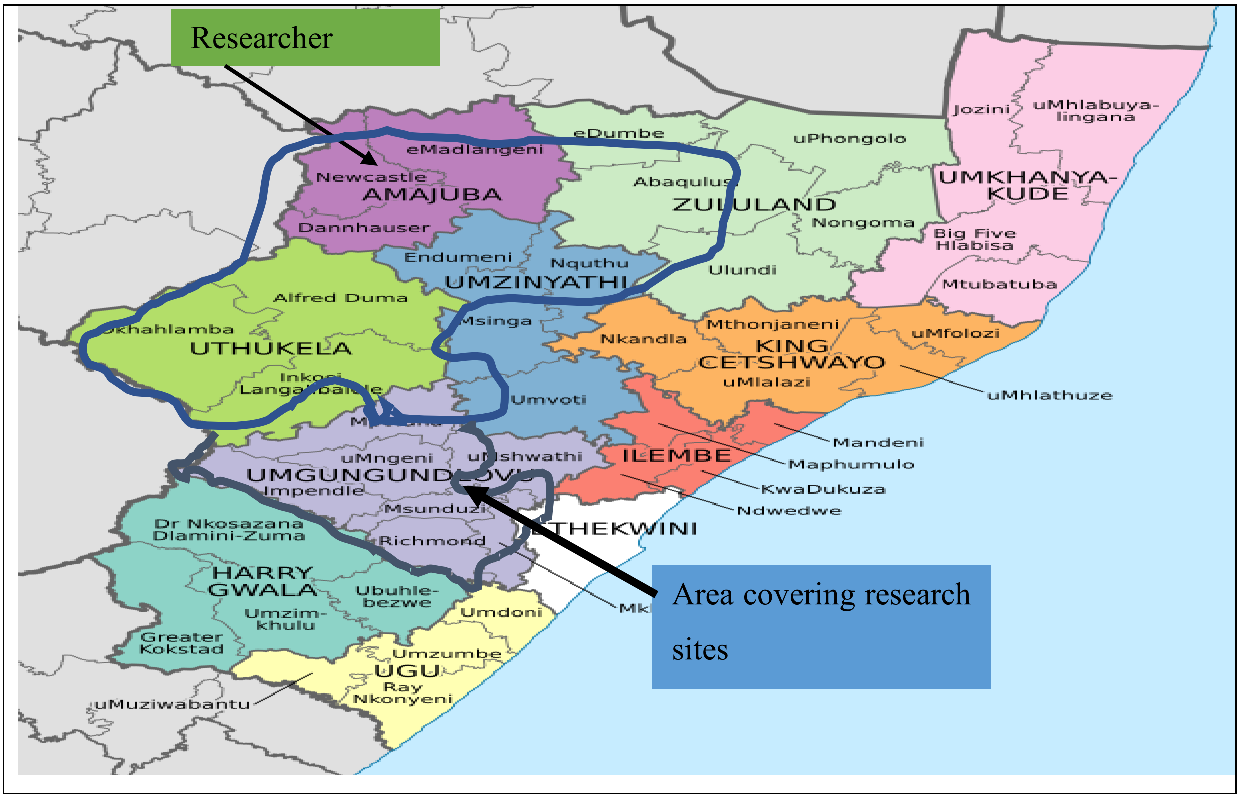

Figure 10: ***Research sites map.***

Source: https://en.wikipedia.org/wiki/List_of_municipalities_in_KwaZulu-Natal

Notes: **Figure 10** displays the map demarcating the district boundaries that my study was carried out in KZN province. The study was centred within the demarcated boundaries.

The next section presents the policy context.

5.4 POLICY CONTEXT

The White Paper for Post-school Education and Training (DHET) (2013), among others, emphasises the integration of the TVET system with industry through college-industry partnerships so that colleges can identify opportunities for WIL (Department of Higher Education and Training 2013b; Papier 2017). Such opportunities enabled TVET lecturers to improve and update their industry knowledge, skills and experience through appropriate work experience (Department of Higher Education and Training 2013b). Through such partnerships, colleges may benefit from equipment donations from the industry. The policy on Professional Qualifications for TVET lecturers emphasises that lecturers teaching at colleges need to be knowledgeable in theoretical and practical aspects of their teaching (Department of Higher Education and Training 2013b). Again, TVET lecturers need to have up-to-date knowledge of the content taught through exposure to experiential learning in the industry (Department of Higher Education and Training 2013b). TVET lecturers must be specialists within their specific disciplines, exhibiting industrial experience and demonstrating a full understanding of the context in which they work.

The National Plan for Higher Education proposes human resource development with the mobilisation of human talent and potential through lifelong learning to rapidly change society's social, economic, cultural and intellectual life (Ministry of Education 2001). There is an emphasis on the production, acquisition, and application of new knowledge so that TVET lecturers can help train and provide the workforce to strengthen this country's enterprises, services, and infrastructure.

The National Education Policy Act, 27 of 1996, was designed to equip lecturers in TVET colleges to meet the demands of a constantly evolving economy and increasingly challenging workplace (Department of Education 2008). The policy aims to establish a national standard for TVET college lecturers, responding to lecturers' needs and responsibilities concerning the college demands. The policy says that TVET college lecturers are primarily responsible for their continuing professional development by finding areas to grow professionally (Department of Higher Education and Training 2015a). Concomitantly, the policy ensures that TVET college lecturers are sufficiently prepared for their core duty of teaching to improve their professional competence, performance and ethical standards of conduct.

The next section discusses the development of teacher education programmes.

5.5 TEACHER EDUCATION PROGRAMMES

In 1994, the South African teacher education setting was disjointed across institutional sites (Kruss 2022). Over time, initial teacher education took place in a very different setting, moulded by years of extensive statutory and policy changes (Kruss 2008; Wedekind 2014). While the policy change was essential and unavoidable after the democratic evolution of 1994, TVET college amalgamation placed some substantial strains on both TVET lecturers and infrastructural needs. Ultimately, the study seeks to establish the nature of TVET lecturers learning during WIL. Discussed next is the TVET college programme mix, which provides an outline of the courses offered and their prerequisites.

5.6 PROGRAMME MIX

The TVET colleges in South Africa offer a wide range of programmes. The programme offerings include Mechanical – (boilermaking, motor and diesel mechanics, fitting and machining, rigging, welding), Electrical - (light and heavy current), Instrumentation, Civil - (bricklaying, Carpentry and Plumbing), Hospitality and Catering, Tourism, Business Management, Public Management, Financial Management and Office Administration. The programmes are available on National Certificate (Vocational) (NC(V)) and NATED. The minimum entry qualification is a Grade 9 as prescribed by the policy. However, those students with matric qualifications and the recommended subject combinations get preference. Some of the colleges have centres of specialisation that focus either on engineering or business courses. The TVET graduates attain the Report 191 National Technical Education qualification, which is commonly known as NATED. It has levels that range from entry-level N1 to exit level N6. The wide range of programmes shows the diverse skills expected of the TVET lecturers. The TVET college context is presented in the next paragraph.

5.7 TVET COLLEGE CONTEXT

Historically, TVET has been closely linked to the national industrialisation process and economic growth. Therefore, TVET college policies were controlled by economic and equity perspectives (United Nations Educational Scientific and Cultural Organisation 2013). The focus of the TVET sector should be essentially economic production, and the system should be driven by skills development for employability in preparing graduates more directly to meet labour force requirements (Maclean and Pavlova 2013; Tikly 2013). Therefore, TVET is perceived as the delivery of skills to support economic, social and environmental sustainability. At the same time, it builds self-reliant citizenry that could venture into entrepreneurship or be gainfully employed. The development of TVET systems and change was based on the perceived role of TVET regarding human skills development (Tikly 2013). TVET is perceived as a fundamentally instrumental function in providing the necessary human capital required by industry (Tikly 2013). The human capital approach offers a linear understanding of the relationship between skills, employment and economic growth. In other words, it adopts a ‘one size fits all’ method to education and skills; without considering the inequalities and marginalisation (Tikly 2013). Thus, TVET's role is to prepare learners for various sustainable industry occupations to add value to the economy and sustain their livelihoods.

Since a TVET education system offers practical skills opportunities for the youth and adults, knowledge and values for lifelong learning skills, the curriculum needs to address the requirements of the learners, industry, and the community. Eventually, graduates must meet the demands of industry skills needs. The improvement of job-related skills is not the only part of the TVET College sector's purpose, as it should embrace employment creation through entrepreneurship, poverty reduction through skills empowerment, socio-economic equality and inclusive economic growth as part of a multipronged approach. A synopsis of different types of colleges in South Africa is given.

5.8 TYPES OF COLLEGES IN SOUTH AFRICA

There are different types of colleges in South Africa. These are public TVET colleges, private TVET colleges and community colleges. The government does not fund private colleges, while the other two are state-funded. The FET Act of 2006 states that the public colleges get funds from the state allocation and students' tuition fees for training programmes provided by the public TVET College. The funding of TVET colleges is based on ministerial programmes that are offered on a full-time basis, such as the National Certificate (Vocational) (NC(V)) and Report 191 NATED Engineering and Business studies. They are funded according to the National Norms and Standards for Funding TVET colleges. Public college is discussed first.

5.8.1 Public TVET Colleges

There are 50 TVET colleges with 250 campuses around South Africa, offering post-school education and training. This post-education and training means the education and training after leaving school, even with a Grade 9 completed. The only age restriction for someone wishing to pursue studies at the TVET level is that they should be 16 years or older. The White Paper for Post-School Education and Training (2013) targets 2.5 million TVET students by 2030 (Department of Higher Education and Training 2014a). The colleges also offer self-sustaining programmes for company employees who wish to upgrade their skills through Recognition to Prior Learning (RPL) and attain a trade qualification. There is another wing offering occupational courses that are funded by SETAs. I approached the site campus managers (principals) and identified a suitable interview venue. I familiarised myself with the participants' geographical settings to better understand their responses (Bryman 2012). A lecturer from a rural college campus may not have the same exposure as a regional town campus lecturer. Generally, campuses in urban areas tend to have more advanced equipment compared to out of town campuses, and town life is fast compared to rural life, and transport issues were noted as crucial because the lecturers used public transport. Hence, my schedule had to fall within those timeframes.

5.8.2 Private TVET Colleges

Private colleges form part of the post-school education system guided by the FET Act No. 16 of 2006. They must be accredited to DHET and comply with quality assurance bodies like Umalusi and other policy prescriptions. The course offerings may vary depending on the demand and location of the institution. DHET, in collaboration with Umalusi and Quality Council for Trades and Occupations (QCTO), oversee the conduct of national examinations. Regarding DHET national examinations, all private colleges that enrol for such examinations are monitored by Umalusi and DHET to ensure consistency and integrity across all colleges (Blom 2011). However, private colleges do not receive government funding from full-time equivalent (FTE), where one FTE is obtained when one student registers all subjects per level. It may justify why private college fees are generally higher than public colleges. Community colleges are presented next.

5.8.3 Community Colleges

Community colleges have different meanings in different countries. Land and Aitchison (2017) define community colleges as comprehensive post-school institutions accessible to locals and offer four post-school education and training types. These are formal education and training, non-formal education and training, vocational and non-vocational education. There are nine community colleges in South Africa, one in each province. The national policy on community colleges pronounces that the minister reserves the right to establish community colleges based on their interests (Department of Higher Education and Training 2015b). Therefore, the term community is not restricted to a geographical community as they may be placed beyond the demarcations of the set geographical borders. The community colleges enrolled about 3 280 adult education and training centres (Department of Higher Education and Training 2013b) at the time of the research study. The community colleges serve people who do not meet admission criteria to TVET colleges or universities. TVET College Times (2019) says that community colleges aim to increase educational access to adults who did not finish school. They also target undereducated people (adults and young) and those people who are not formally employed.

Ayarkwa, Adinyira and Osei-Asibey (2012) reported that community colleges form a greater part of the post-school education in North America and India and are primarily vocational. However, they offer remedial education and skills courses for the disadvantaged. Lolwana (2009) agrees that community college programmes include second chance secondary education, technical education, work preparation and upskilling, community development, continuing education and entrepreneurship courses. There are differences between the community colleges and the South African context in that the developed countries' TVET offers post-school and post-school education while South Africa provides for adult education. The similarities include their flexibility in offering tailored courses according to local community needs, such as short courses. For example, in Newcastle, the community college targeted tailoring because Chinese factories dominate the industry area.

The policy on community colleges provides vocational training that prepares people for participation in the formal and informal economy and gives room for partnerships with local communities, public organisations and employer organisations. These parties support the alignment of programmes with specific requirements according to the latest developments in technology. The South African government has committed to increasing its people's involvement in community education and training to one million by 2030 (Department of Higher Education and Training 2013b). The colleges A-C, where I generated data from participants, are presented starting with College A.

5.9 COLLEGE A

College A is situated in KwaZulu-Natal around the Durban area. College A was previously known as Sivananda FET College. Its new name came after the merger of three former public technical colleges in 2002, namely, Ntuzuma Technical College, Sivananda Technical College, and Pinetown Technical College (Elangeni TVET College 2020).

Staffing at the college stands at 500, while students' enrolment is 12 000 (Department of Higher Education and Training 2017a). The college offers full-time, part-time and long-distance learning. College A offers a national diploma, NCV, skills programmes and learnership courses. There is a range of programmes offered at the eight campuses. It offers

Engineering and Business studies courses up to the N6 level. The catchment area stretches in and around different districts of the coastal town. College A has eight campuses covering a wide range of programmes and services, mostly the rural community.

The programme offering covers NCV programmes in Civil Engineering and Building Construction, Electrical Infrastructure Construction, Engineering and Related Design, Finance, Economics and Accounting, Hospitality, Information Technology and Computer Science, Office Administration, Primary Agriculture, Safety in Society and Tourism. The NATED engineering courses are in Mechanical, Electrical and Civil Engineering. The business studies courses are Business Management, Human Resource Management, Financial Management, Management Assistant and Public Management.

Except for the Pinetown campus, all other campuses fall into peri-urban areas characterised by unemployment, high illiteracy rates and single-parent families (Mthashana TVET College 2019). Against this background and similar to other TVET colleges, College A provides bursary programmes funded by the National Students Financial Aid Scheme (NSFAS). The scheme sets out a criterion applicable to all prospective students in South Africa. However, learners repeating levels do not qualify to apply for the bursary.

Some of the college campuses are located in towns where there are industries and local municipalities. College A also partnered with a local company, MAN Trucks, in 2018, and municipalities where plumbing students engage in fixing water leaks (Elangeni TVET College 2020). The partnership seemingly benefited lecturers, students and the community. Positionality plays a positive role for College A, as there are more chances that TVET lecturers may get attachment places at their companies of choice. The South African Bureau of Standards provides accreditation and approves the college to provide standards, management systems and regulatory information. College B from the north-eastern province is presented next.

5.10 COLLEGE B

College B is situated in the Northern Region of KwaZulu-Natal and covers a large area served by three Districts: Zululand, uMkhanyakude uMzinyathi District Municipalities. The College catchment area is characterised by high levels of unemployment high poverty rate. The total population is about 1 400 000 people, 45% are employed, and 36% have no formal schooling experience (Mthashana TVET College 2016). The absence of industries certainly contributes to the above situation.

The location places College B in an exceptional position as a rural college servicing mostly needy people. This created many opportunities but also held many challenges. A college in this region gave hope to many young people in the area by providing an essential entry to skills and employment. Nevertheless, there is an increasing task of not meeting the needs of all young people who have many ambitions. Most students enrolling at college B come from a humble upbringing and require government financial support to study. Another challenge is that some students entering the college are ill-prepared for college culture (Mthashana TVET College 2019). As a result, they struggle to complete their respective courses on time or even fail to graduate, worst-case scenarios.

It also offered NC(V) and NATED (Engineering and Business) courses. College B had eight campuses around Vryheid, Dumbe and Nongoma. This college is situated in north-eastern KwaZulu-Natal. It covered three Districts: Zululand, UMkhanyakude and UMzinyathi District municipality (Mthashana TVET College 2016). However, the challenge is a lack of industries contributing to the high poverty and illiteracy rate. The entire staff was 250, while enrolment was 6000 students (Department of Higher Education and Training 2017a). The college where I belong is presented.

5.11 COLLEGE C

College C stretched from Amajuba to UMzinyathi District. The college has eight campuses covering a wide range of programmes. The main campuses offered engineering and business courses, while other special units offered short courses, trade test preparation skills and trade tests for fitting, turning, electrical, boilermaking, welder, bricklaying, plumbing and carpentry. The programmes on offer were NC(V) levels 2, 3 and 4, including Engineering and Related Design, Electrical Infrastructure Construction, Civil and Building Construction, Primary Agriculture, Office Administration, Hospitality and Tourism. Report 191 or National Technical Education (NATED) had six sub-levels (N1-N6) for engineering studies and three or four sub-levels (Introductory, N4-N6) for Business Studies (Department of Higher Education and Training 2017a). The mechanical engineering courses included fitting and turning, boilermaking, motor and diesel mechanics, welding and rigging. The electrical courses were light and heavy current, instrumentation and millwright. The introductory civil courses were bricklaying, plastering and plumbing. The engineering division offered a chemical course in water and wastewater treatment, which opened possible career paths in chemical manufacturing and process control.

The college offers Business Management, Financial Management, Human Resource Management, Management Assistant, Farming Management, Hospitality and Public Management. These courses led to possible career paths in small business management, entrepreneurship, banking industry, financial services, administration, farm management and public administration office work.

Some industries give life to the town and support the college by sending apprentices to do theory trade subjects, requiring trade testing. The industries form the northern industrial hub of KZN, where people and the corporate converged for services. The programmes offered included both ministerial and non-ministerial programmes. I am based at one of the campuses offering non-funded programmes where students pay full fees. To promote unprejudiced consideration of a question, I asked questions and listened to responses without interfering with participants. Another self-sustaining campus, a centre of excellence, provides mechanical and electrical practical courses and trade tests. The other campus offers short courses and received funding from the Sector Education and Training Authority (SETAs). This campus targets the corporate world, individuals and offers staff development programmes to college employees.

The training officers had a direct link with the industry. The training officers' main responsibility was to train industry-related skills before being exposed to the industry environment. The college had a staff complement of 560 permanent and contract employees (Department of Higher Education and Training 2017a), of which 100 were support staff. The yearly enrolment for College C was 28000 for all programmes. Companies were used to generate data from company personnel. The first company is presented.

5.12 COMPANY 1

Company 1 is located in the northern KwaZulu-Natal Province. It is the country's foremost supplier of steel profile products. Company 1 had all the sections supporting the production and smooth running of the organisation. The training division managed the recruitment, induction and placement of WIL lecturers in the different sections of the plant, where they received appropriate training according to their logbooks and field of expertise. I met the Training Manager, who played a central role in ensuring that superintendents received lecturers and afforded them a fair chance to learn through plant exposure and experience.

Company 1 had a large staff complement of 2 290 employees working in all the different sections. The company had all the professional employees needed to function effectively. Safety protocols were observed and reinforced by safety officers in the workplace. There were traffic officers who ensured that all road instructions were observed to the letter. With a zero-tolerance policy on offenders, heavy penalties were imposed to discourage violation of standing procedures. In the worst-case scenarios, offenders were dismissed.

The Company produced different steel grades from low-carbon to high-carbon steels and alloy steels. It had sophisticated information systems and competed globally. The sophistication meant that machines were automated. Therefore, TVET lecturers had practical, experiential learning using current technology. The plant houses coke ovens batteries, a sinter plant, a blast furnace, two basic oxygen furnaces and four rolling mills (Arcelormittal South Africa 2021).

There were substantial plant maintenance and repairs in the whole plant. I was fortunate to visit a more substantial part of the plants where lecturers were actively involved in different trade activities. Besides steel manufacturing, I visited four sections: water recycling and raw water purification for human consumption, a coke-making plant, a bar mill, and the maintenance workshop. Recycled water was used in the various plants as a cooling agent. The manufacturing of unique profiles products like Y and I standard fencing posts, T-section droppers and palisade fencing sections, and a full range of window sections helped lecturers understand the manufacturing process and uses of different steel types and sections. Training Manager 1 at Company 1 said:

> *Attachment is a groundbreaking exercise that gives the bolts and nuts of the trade. Attachment, in my view, exposes lecturers to the demands and challenges of the workplace. They gain practical experience, work ethics, develop a professional network and understand what can I say the workplace expectations.*

The Training Manager outlined the industry experiences gained by TVET lecturers during WIL. For example, from the excerpt, the Training Manager talks of workplace experience as a benefit of industry attachment. The next section discusses Company 2.

5.13 COMPANY 2

Company 2 was a building and construction company with its primary focus on civil and road construction engineering. Civil construction included bricklaying, plastering, paving, carpentry and concrete work. Within construction, the company also did surveying and material testing. The company was a relatively small organisation in terms of employee numbers and management structures. The business owner was hands-on and formed part of my participants as a Training Manager. Company 2 hosted four TVET lecturers: 2 in bricklaying; 1 in carpentry and plumbing. There were qualified artisans in each field, although their job titles were not clearly defined. The staff complement was around 12 permanent employees, and the rest were trainees and contract workers who were hired when there was work to be done.

The Training Manager 1 at Company 1 confirmed that:

> *These people just got a fortune. They were exposed to different functions of the sector, and they can do any construction job you can think of from types of casting, building structures from brick and concrete, paving using brick, concrete and tar and road construction. Foundations and trenching also.*

It appeared that TVET lecturers had a learning opportunity in industry, which was cited as "a fortune" exposing them to various building construction practical tasks. Qualified drivers operate the expensive earthmoving equipment to dig trenches and excavate bulk earthworks, place and trim earthworks and gravels in a grader. Some of the machines used at Company 2 included some Germany company brands like BOMAG, vibrating plate compactor, rammer, breaker, dumper, concrete mixer, welding machine, drilling machine, theodolite, jackhammer, stamper, roller for soil compaction and Pop vibrator for compaction of concrete. TVET lecturers had access to some of the machines and gained experience thereof.

Lecturer 1 at Company reiterated the issue of safety at Company 1 and said:

> *The issue of safety, as I said before. It is easy to get injured, diseases, get ill. Those are the disadvantages of the WIL programme. Working on high rise*

> *buildings, there are dangers of falling and working in a dusty area. There are dangers of TB infection.*

The nature of the construction industry seemed unique compared to other plant or workshop-based industries. The construction industry showed that the working conditions seemed different and more physically challenging than other industries.
The next section discusses Company 3.

5.14 COMPANY 3

Company 3 is situated in Newcastle, KZN, within the industrial area on a large area where they have spread their operations. There are boilermaking workshops, with a large section housing a training facility that includes two classrooms large enough to host about 30 learners. The workshops were equipped with high-end machinery, which enabled skills transfer, focusing on precise detail to specifications. The core business of Company 3 is boilermaking and welding. The mechanical workshop was equipped with the following machines: Hydraulic and mechanically driven plate rolls, centre lathe, hydraulic guillotine, punch, cropping and shears, bending press, rolling machine, radial arm drills and several cutting machines. Other equipment that supported the construction work included mobile cranes and forklifts, which allowed heavy construction work. Boilermaking Lecturer 4 echoed:

> *The working environment, truthfully, is not good. On the first day, we went for a medical test to check how fit you are before starting a job. Some companies are not the setup of a workshop. You work from outside so when it is raining you get wet. There is sand, and it is dusty, and there are overhead machines. Aaah, it is so dangerous, so you need to be wise and always think about safety around the workplace.*

The fields of operation at Company 3 included work in power generation, mining industry, petrochemical industry, food and beverage industry, and the iron and steel industry. The tasks were not limited to repairs on tube leaks, boilers, ducts, plant maintenance, fabrication and repairs of heavy earth-moving plants, welding, heat treatment and machining of components and maintenance on underground machinery. Working in any of the listed company sections above demanded strict adherence to safety protocols to avoid incidences and fatalities. The welding tasks that I observed scripted on the task board were:

- Safety and induction to the welding trade, basic scaffolding and rigging,
- Arc and gas welding, and brazing,

- Shielded metal arc welding and $C0_2$ aluminium welding,
- Tungsten inert gas welding (argon),
- Metal inert gas welding and manual metal arc welding.

Lecturer 4 reported training on induction, basic safety and introduction to boilermaking and welding. Lecturers reported to doing all the listed skills above. In addition, fabrication, developments, structural marking and cutting using guillotine, grinder and cutting torch was done.

Company 3 had full accreditation with the Manufacturing Engineering and Related Services SETA (MerSETA) and Chemical Industries Education and Training Authority (CHIETA). The accreditation allows it to offer short courses like shielded metal arc welding (CO_2, argon, aluminium, tungsten, welding), basic rigging procedures and health and safety. Furthermore, apprenticeship training is offered in boilermaking and welding courses. Company 3 places great emphasis on safety, health and environmental aspects. To that effect, four accredited safety officers are responsible for making safety decisions at each site. Figure 11 below shows the workshop structure at Company 3.

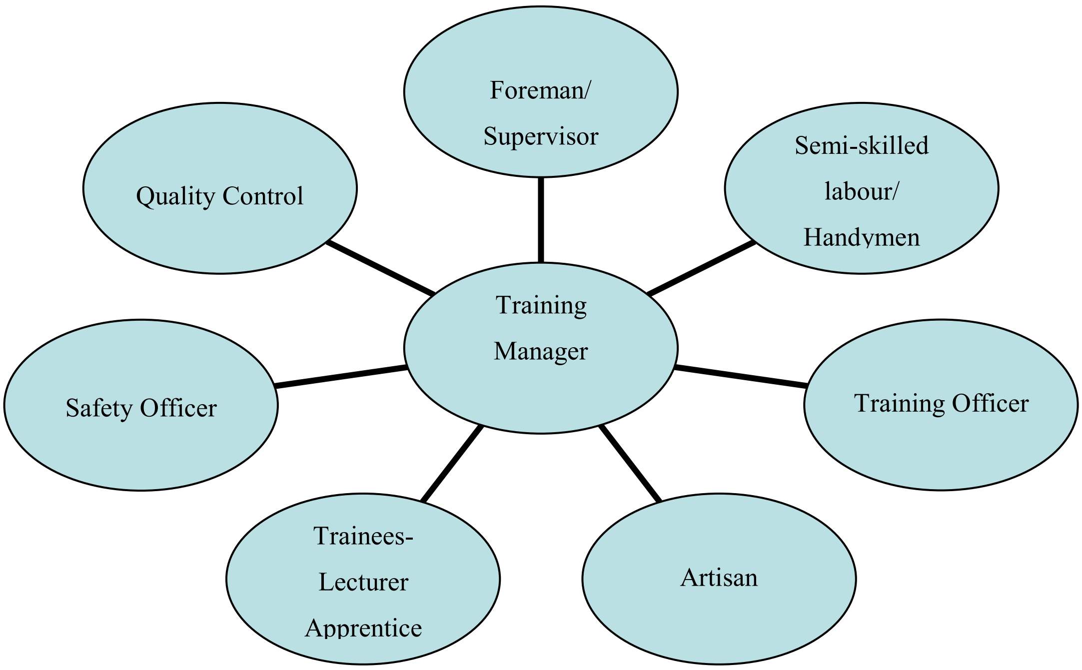

Figure 11: Workshop Structure

Source: Designed by the author using industry workforce.

Notes: **Figure 11** shows the designations of Company 3 training workshop staff. The list is not comprehensive. However, the designations focused on workshop staff only.

The training is facilitated by a well-groomed training workforce comprised of a Training Manager, technical training Officer, qualified artisan, facilitator, and workshop foreman. Therefore, TVET lecturers attached to the company most likely had a fair opportunity to learn practical skills. However, whether or not lecturers learnt the skills is yet to be presented in the following chapter.

5.15 INDUSTRY PLACEMENT

The industry placement considers the period, duties to be performed, the length of the attachment, and the expected contribution level. The placement either serves as a refresher course where the lecturer may want to update on current practices or a new skills placement where the lecturer needs to acquire new knowledge and skills for the first time (Bergami, Schuller and Cheok 2011). This was the case in this study, where lecturers sought to develop new knowledge and skills through the WIL process.
The next section concludes the chapter.

5.16 CHAPTER SUMMARY

In this chapter, the TVET colleges present the context in which this study was conducted to provide an essential background that would help understand the TVET lecturer learning through WIL. The research sites show the setting in which the lecturers operate. The sites are widespread from urban to rural. Therefore, some areas were naturally deprived of exposure due to their positionality.

The next chapter presents findings generated from the research sites.

CHAPTER 6: DATA PRESENTATION AND ANALYSIS

6.1 INTRODUCTION

The purpose of the study was to explore TVET lecturer learning during WIL, specifically to establish how they learn (the nature of their learning), the kinds of knowledge they gained, and to determine how lecturers understood their learning. The previous chapter discussed the participants' profiling and the research sites: the TVET colleges – employers of the participants, and the industries where lecturers were attached for WIL. Chapter 4 presented the research design and methodology adopted for the study covering the interpretive paradigm, case study design, and qualitative approach in which the study was located. Data were generated through individual interviews with 18 lecturers and nine industry personnel. Interviews were complemented by observations of nine lecturers attached for WIL. Data were analysed using open coding, which involved sorting and organising data according to research questions, followed by coding, categorising and then clustering categories to form themes. These themes provided a structure for the presentation and analysis of findings.

The key research question that the study addressed was: How do TVET lecturers learn through WIL? This key question was addressed through the following sub-questions:

- How do TVET lecturers learn through WIL?
- What are the kinds of knowledge that TVET lecturers gain through WIL?
- What are the TVET lecturers' conceptions of their learning through WIL?
- What could be a suitable model for TVET lecturer WIL implementation?

In this study, each research question constitutes a chapter, except the fourth question, which proposes a model for TVET lecturer WIL. Thus, there are three data presentation and analysis chapters. The current chapter presents and analyses data that addresses question one on the nature of TVET lecturer learning through WIL from where they realised some learning. The learning activities included bricklaying, plastering, welding, troubleshooting, machining, assembling parts, electrical installations, plant and general maintenance. Generally, these lecturers experienced learning through two major spaces: through practice and through other people. Both TVET lecturers' responses on WIL and employers are integrated and presented together as they were broadly similar. Where differences occur, they are highlighted. Data from observations are also blended during the discussion to show concurrences or contradictions.

In interpreting data, I drew on literature to establish alignment with existing research. I also drew on Kolb (1984) Experiential Learning Theory (ELT) in order to explain the findings. Kolb's theory suggests that experiential learning takes a cyclical pattern with four stages: concrete experience, reflective observation, abstract thinking and active experimentation. Thus, the theory helps to understand whether lecturers experience learning through all the stages in that order or in a divergent manner. I also drew on some of the concepts from Bergami and Schuller's model to help explain the findings. The model includes aspects of teacher industry placement and placement experiences, skills developed, and how the learning could be applied. The model's core lies in the community of practice circle, including knowledge and skills acquisition and industry networks.

Research question 1 about how TVET lecturers learn through WIL focuses on the nature of their learning in industry. This is addressed through themes and sub-themes. Seven themes emerged from the data addressing this research question. These were, learning through induction and mentoring, learning through practice, learning through meetings, learning through reflection, learning through teamwork, and safety workshops and assessments. These themes and their sub-themes are discussed and summarised as presented diagrammatically in **Figure 12**.

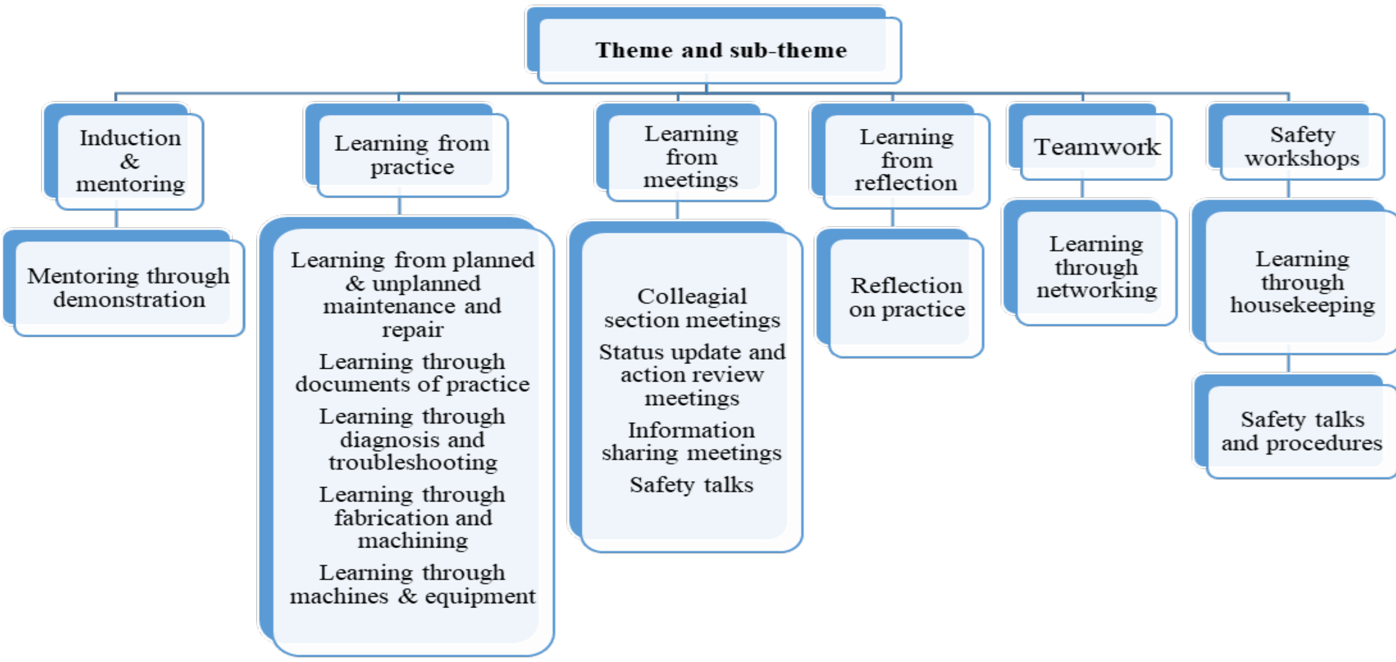

Figure 12: **Themes and sub-themes**

Source: Author's diagram generated from research findings.

Notes: **Figure 12** above was generated from the categorised themes and sub-themes emerging from the research findings.

To ensure all participants' anonymity and confidentiality, I used numerical codes from 1 to 18 to identify lecturers. However, scholars such as Van Den Hoonaard (2003) and Saunders, Kitzinger and Kitzinger (2015) contend that completely concealing identities is virtually impossible. Furthermore, participants' occupations were significant in bringing out the meaning and, therefore, difficult to remove or modify (Moore 2013). Company participants were identified in the following categories: Foremen 1-3; Training Manager 1-3; Civil engineering Company 1; Electro/Mechanical Company 2; Mechanical Company 3; and Training Officers 1-3. The first theme is learning induction and mentoring.

6.2 INDUCTION AND MENTORING

Induction is a learning process meant to promote TVET lecturers learning through WIL to familiarise and adapt to the systems. Gholam (2018) defines induction as providing knowledge and skills to improve novices' performance in doing their job. Therefore, induction in industry was provided to lecturers on WIL as a prerequisite to access the work area and equipment. Mentoring[4] in the workplace is a process where an experienced artisan (mentor) provided ongoing on-spot guidance on processes and technical information to the TVET lecturer on WIL over a long period. In this mentoring process, the supervisor assisted TVET lecturers in accomplishing specific tasks and learning from this support (Uen *et al.* 2018). Generally, mentoring gave direction to industrial processes in the long term, while induction served as an initiation process for lecturers on WIL to the industry on arrival.

Twenty-three participants (both lecturers and industry personnel) from construction, electrical and mechanical industries highlighted learning through induction before using machines and equipment. There was consensus that the nature of lecturer learning included induction, where they observed how to operate machines before they could use them. A lecturer at the

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[4] Uen, Chang, McConville and Tsai (2018) submit that mentoring, as a "social learning process", could assist lecturers on WIL to merge into the organisation more rapidly.

civil engineering industry commented: *"Proper workplace training had to take place before using any machine"* (*Lecturer 14)*. Such training involved a basic introduction to machine use and behaviour to acquaint themselves with conventional and automated machines. My observations showed conformity where lecturers were noticed receiving machine training at Company 1. They were taught how to operate dumper, concrete mixer and compactors. In describing what makes a good VET teacher, Smith and Yasukawa (2017) describe learning to hear the sounds of trouble when using machines and tools. Proper workplace training for a lecturer during WIL suggested that the lecturer was probably coached through a scheduled induction programme that prepared the lecturer for the industry. Through induction, TVET lecturers were introduced to company culture and processes to catch up as quickly as possible, feel socially comfortable and become aware of their responsibilities. Training in WIL refers to teaching and learning activities that help lecturers acquire and apply knowledge, skills, abilities, and attitudes needed for a particular task. The findings are consistent with the literature (Van der Bijl and Taylor 2016) that companies require more time to gain trust and test lecturer competencies before permitting them to work independently. A lecturer from the boilermaking industry at Company 2 also responded:

> *We were taught to operate machines to get a permit to enter the plant and operate the machines. Anyone found operating a machine without a permit was dismissed without any suspension because of zero tolerance to accidents (Lecturer 4).*

The twenty-three participants confirmed the induction process from which they experienced learning. At Company 3, two similar responses from electrical lecturers also stated: *"There was induction on how to use machines"* (Lecturer 18). Similarly, Lecturer 12 added: *"The artisans and the supervisors give us induction first. You cannot use any machine without induction on how that machine works"*. Lecturers agreed that there was learning through induction during WIL. Through induction, the nature of lecturer learning included how to use industry machines before engaging in any duty. Findings from this study show conformity with Uen *et al.* (2018), who acknowledged that the supervisor assisted in accomplishing tasks to support TVET lecturer learning through the mentoring process. The findings are consistent with the literature (Van der Bijl and Taylor 2016) that companies require more time to gain trust and test lecturer competencies before permitting them to work independently. The findings are in tandem with Govender and Wait (2017), who put forward that WIL experience had significant benefits because induction provided clear, helpful, supportive and professional theory-practical linkages. Literature studied (Govender and Wait 2017) further identified significant WIL benefits through induction, where lecturers are introduced to the equipment, working teams, and allocated tasks and responsibilities. A study by Clayton (2013) stated that workplace training was supported by mentoring from appropriately experienced industry personnel.

Kolb describes this stage as active experimentation, where learners try out what they have learnt (Kolb 1984). Regarding lecturer learning through induction, my observation at Company 2 confirms what Lecturer 4 said, that a permit was needed to access the plant and operate machines. After undergoing a one-day induction course and writing an induction competence test, I got a permit to access the plant to observe TVET lecturers learning through WIL.

From the discussions above, lecturers experienced learning through induction at the workplace. As I observed at the company, the TVET lecturers were inducted as a prerequisite to using the machines. Induction training is provided to the workforce to acquaint them with the company's conditions, rules and regulations, and setup (Khalid, Aslam and Khalil 2021). A permit was proof that a lecturer on WIL had passed the induction test and was ready to enter the plant. The response is aligned with researched literature where companies resisted lecturers on WIL to work independently in dangerous and high-risk work environments (Van der Bijl and Taylor 2016). Many other authorities described induction as a period when lecturers had their first experience and adjusted to their roles and responsibilities ((Smith and Ingersoll 2004; Nielsen, Barry and Addison 2007; Long *et al.* 2012). The assertion confirms that the industry considered induction vital in ensuring lecturers experienced appropriate learning to engage in processes. The findings are in tandem with Bergami and Schuller's model, which indicates that irrespective of the type of industry, the lecturer encounters a period of adaptation and adjustment to the host company (Bergami and Schuller 2009). Kolb (1984) ELT describes experiential learning as a human adaptation process to the social and physical environment. In this case, it occurred through induction.

In addition to learning through induction, sixteen lecturers also experienced learning through mentoring. Mukeredzi and Manwa (2019) regard mentoring as a vital component of teacher learning, emphasising inquiry, experimentation and reflection. Mentoring is further explained as occurring through demonstrations. Mentoring has a significant and positive impact which offered lecturers learning during WIL to develop career goals and feel integrated into work

(Uen *et al.* 2018). Previous studies show that mentoring positively affects employee performance (Scandura and Schriesheim 1994; Lester *et al.* 2011) which implies that mentoring may positively influence and shape lecturer learning during WIL. The following comments were made by one lecturer learning through mentoring during WIL:

> *My mentor was always on my side to show me how to do things. Even if I knew how to do it, a mentor was there to show different ways to 'kill a cat'. Sometimes it takes a long way to make a particular task, but there is a short cut which is good because, in boilermaking, they say do not waste material, time and money (Lecturer 4).*

The excerpt above showed how supervisors supported lecturer learning during WIL through mentoring. Uen *et al.* (2018: 95) argue, "When a mentor is perceived as knowledgeable, skilled and competent in performing the role of mentor, this influences mentee's experiences of training, trust and socialisation". The mentors (artisans) who guided TVET lecturers had some of these attributes. When the lecturer said the mentor was always on the side, it appeared that the lecturer had close guidance from the mentor. Hence, TVET lecturers got instant feedback during their practical learning. The metaphor 'many ways to kill a cat' explained that the mentor provided different industrial processes methods. Furthermore, some lecturers on WIL may have learnt acceptable practices on performing tasks in the shortest possible time using minimum material as mentors exposed them to shortcuts. A majority of participants (24) acknowledged that qualified artisans were instrumental in mentoring them during WIL as follows: "*The artisans were always on the forefront assisting to have a job started and outlining the ways to be followed to make sure the job is correctly done" (Lecturer 17).* The artisans worked closely with TVET lecturers through mentoring during WIL by ensuring that they understood the tasks through their timeous guidance and mentoring. Researched literature emphasises lecturer open-mindedness and willingness to listen to guidance from others and act upon criticism (Dewey 1933). According to Kolb's theory, lecturers learning through WIL go through the active experimentation stage to try out what they learnt after induction and mentoring. Kolb's theory reinforces active involvement, which leads to learning, then questioning time during reflective observation. Lecturers then compare what they have done and how they could have done it better. Finally, the lecturer puts into practice what was learnt, considering all changes needed to yield desired results.

6.2.1 MENTORING AND DEMONSTRATIONS

TVET lecturer learning from mentoring was also through observations of demonstrations of artisans working on different processes. In this regard, most human behaviour is learnt observationally from others (Bandura 1977). It gives rise to new ideas and the modification of existing abstract concepts. This is Kolb's active experimentation stage 4, which involves putting 'theory' learnt from reflection and conceptualisation into practice, attaining new practical experience with new ideas and simulating through working with practical applications (Kolb 1984). Literature consulted (Gosling and Moon 2001) further confirms that the learner (TVET lecturers) puts what they learnt during this phase into practice. The following interview extract illustrates learning from observation: "*Supervisors would take me through and show how things are done. This is learning through seeing. They would demonstrate everything in front of me" (Lecturer 2).* The response showed that the lecturer learning was from observing operators and artisans engaging in operations. A plumbing lecturer from civil engineering Company 1 reported, "*I watch and observe what the artisan plumber does" (Lecturer 11).* A training officer at the carpentry, civil engineering Company 1 confirmed, "*Lecturers had an observation of my demonstrations on processes" (Training Officer 3).* The excerpts show that lecturers went through Kolb's reflective observation stage to examine and evaluate the experience.

From the comments above, Lecturers 2 and 11 learning through WIL involved observing demonstrations from artisans. Industry personnel concurred that lecturers watched the demonstrations on industry processes. Demonstrations were a part of the nature of lecturer learning by motivating and enabling lecturers to see how processes were carried out practically. At Company 1, I observed the artisan demonstrating the laying, joining, and mounting copper pipes on the wall to lecturers. Hence, the demonstration showed the step-by-step procedures for using machines and materials. At this stage, the lecturer or student is exposed to the industrial activities of the host company where the placement is taking place. Irrespective of the industry, the TVET lecturer encounters a period of adaptation and adjustment to the host company's culture. Bergami and Schuller's model aligns with this finding that the teacher will observe, analyse, reflect, deconstruct and reconstruct the workplace processes, thereby gaining new insights that should enable progression to the next step in the model.

From the above discussion, artisans explained their demonstrations while lecturers observed, reflected and learnt how to use tools and equipment. Lecturers on WIL learnt acceptable practices using cost-cutting measures on time and material. Generally, mentoring formed part of the nature of their learning and gave direction to industry processes, while induction served as an initiation process to introduce lecturers to industrial processes. Lecturers learning through induction and mentoring during WIL were closely guided by experienced artisans and supervisors through step-by-step demonstrations on performing tasks. A majority of participants at all companies acknowledged that qualified artisans were instrumental in mentoring them during WIL. Through mentoring, lecturers went through Kolb's reflective observation and got new ideas through analysing, modifying and evaluating experiences (Kolb 1984). The following section discusses learning through practice.

6.3 LEARNING THROUGH PRACTICE

Regarding the nature of their learning, TVET lecturers' practice was one of the major themes that emerged. Learning through practice in this study referred to learning by doing or experiencing the industry's actual work. The ELT postulated by Kolb (1984) indicates that experiential learning appears in a cycle with four stages where individuals learn by doing the actual work in an industrial environment. Reviewed literature emphasised learning through practice to develop the skills needed for work, highlighting that WIL developed occupational competence (Billett 2010). Thus, learning through practice critically influences the initial and ongoing development of occupational competence for TVET lecturers. Literature sourced further described that industrial exposure is on-the-job training in which the TVET lecturer gains practical skills while working in an industry environment, using the equipment and machinery (Oosthuizen and van der Bijl 2019). Lecturers learnt through practice when they engaged in hands-on tasks. The engagement of lecturers in the industry presented them with opportunities to participate actively in practical learning. Van der Bijl and Taylor (2018) show that TVET lecturers attended WIL to gain practical experience and bridge the gap between the college curriculum and industry requirements.

Therefore, lecturer learning through practice is a fundamental process that exposed different industrial equipment and processes. There is consensus that learning involves 'doing' and thinking about 'doing' (Hammond 2011). To address TVET lecturer learning through WIL in this chapter, I discuss learning through fabrication and machining, learning from planned and unplanned maintenance and repair, learning through diagnosis and troubleshooting, and learning through documents of practice. **Table 4** below shows a summary of participants who referred to the different aspects discussed in this chapter.

In **Table 4**, the responses for each sub-theme were collated and totalled below each column and referred to in the discussion. The table shows that of the 18 lecturers, 17 experienced learning through housekeeping, 15 experienced learning from safety precautions and meetings, 14 from documents of practice and 11 through planned and unplanned maintenance. Fabrication and practical assessments were the least mentioned by three and four, respectively. Fabrication had only 3 participants involved in the study. Practical assessments had low responses, probably because most companies focused on their production targets than training. As supported by research literature, housekeeping and safety precautions had the highest responses, probably because most companies valued safety practices to minimise risk and hazards (Mora *et al.* 2018). All the boilermaking lecturers referred to learning fabrication skills in **Table 4**. Detailed participant responses are presented in Annexure 1. TVET lecturer learning from planned and unplanned maintenance and repair is discussed below.

Table 4: Participant Responses

Sub-theme	Learning through housekeeping	Planned and unplanned maintenance and repair	Induction and mentoring	Safety precautions	Meeting	Documents of practice	Safety talks	Diagnosis and troubleshooting	Reflection on practice	Teamwork		Learning through the use of machinery	Fabrication	Learning through observation and demonstration
										Learning through networking	Learning through reports			
Lecturer totals	17	17	16	15	15	14	8	8	8	9	6	6	3	2
Total for industry personnel	2	8	7	5	4	4	8	7	0	2	5	5	0	4
Grand Total for all participants	19	25	23	20	19	18	16	15	8	11	11	11	3	6

Source: Designed by author from participant responses.

Notes: These were participant responses generated from interviews with lecturers and industry personnel. The highest lecturer responses ranged from 14 to 17, while 2 to 6 were the lowest.

6.3.1 Learning from planned and unplanned maintenance and repair

Table 4 above shows that 17 participants confirmed that they had learnt significant concepts in planned and unplanned maintenance and repair processes from all companies. Eleven TVET lecturers gained practical experience from civil, electrical and mechanical industries through planned and unplanned maintenance and repair. Mechanical production and maintenance and civil-building and construction industries specialised in one line of business. Hence, exposure was limited to those areas. During observation at Company 2, I noted their production specialised in the same products like machining crusher rollers, flanges and fitting a set of components in position. Therefore, there was routine work all the time where lecturers repeated the same cycles and thereby gained experience. The literature (Akkerman and Bakker 2012; Malale and Sentsho 2014) confirms routine work as boring, where big industries use line production, and the same sequence of operations are repeated.

While routine work is monotonous, other people can comprehend the concept and become specialists in that particular work aspect. Some of the lecturers experienced learning through planned maintenance. They used different types of tools as described by electrical Lecturer 3 at Company 3: "*Most of the time we fix overhead lights, do testing in the control room for balanced loads and take readings on the panels for the current, voltage and power using multimeter".* The response from the TVET lecturer suggested that they experienced learning from fixing faulty equipment. In fixing lights, as highlighted by Lecturer 3 above, there was learning on electrical maintenance to restore the electrical equipment's working condition and ensure the availability of electricity to consumers. Testing in the control room implied that lecturers had a learning platform on the distribution network, remote switching on and off for planned maintenance and fault repair and receiving customer complaints. I observed this in the control room at Company 2, where all water plant functions were controlled in this room. The use of a multimeter[5] offered learning through the testing of electrical equipment. This testing exposed lecturers on WIL to the use of sophisticated machinery and equipment, which offered them learning. The processes enabled the lecturers to gain what Kolb's theory refers to as concrete experience.

[5] A multimeter is also known as a multitester which is an electronic measuring instrument that combines several measurement functions in one unit (Arnold, 2005).

Effective maintenance strategies are necessary for any engineering company to minimise operation costs and downtime while maximising plant availability. Similar sentiments were raised by Lecturer 17 at Company 3, who echoed: *"We do preventative maintenance and testing of electrical systems and keep maintenance records".* Learning through testing of equipment during maintenance also elaborated the nature of learning, which suggested that planned maintenance was common to TVET lecturer learning during WIL. The interview extract below from mechanical Lecturer 5 at Company 2 captures learning through plant maintenance:

> *One day I will be attending to different pumps trying to rectify anything that might not work correctly, then another day, I am assigned to the plant for maintenance, another day, I will be assigned to gearboxes.*

The response above also suggests concrete experience where the nature of TVET lecturer learning through WIL occurred through maintenance since the plant housed a wide range of engineering systems and components. The fitting lecturer experienced learning through engagement in the planned maintenance of different pump[6] types and gearboxes used in the plant[7]. In the observation visit at the company, I noted that the plant experience, which according to Kolb's theory offered concrete experiences, was common among the engineering participants, which suggested that entering the plant provided some learning. While the lecturer was exposed to different plant sections and probably learnt several things, that kind of learning did not give them an in-depth grasp of what happens in one particular area. In this light, Verma and Ramesh (2007) concur that engineering plants have multiple units in the form of systems, sub-systems and components. Both Lecturers 4 and 5 at Company 2 were rotated around different plant sections but without a thorough understanding of plant processes. In contrast, Lecturer 17 above experienced preventative maintenance where their learning was predetermined and limited. Although the rotation appeared to positively affect lecturer learning through WIL by engaging in many different tasks, the lack of a thorough engagement may have curtailed the depth of their learning. Lecturer 16 also highlighted maintenance as a source of experiential learning from the electrical industry at Company 3, and expressed the following experiences:

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[6] A pump is a device that converts mechanical energy into hydraulic energy and transports a fluid from one point to another point (Brink & Maraschin, 2008).
[7] A plant refers to a place where an industrial or manufacturing process takes place.

We learnt all procedures for installing electrical systems as well as local regulations and safety requirements. We completed maintenance work orders on electrical equipment, electrical wiring tasks, alignment adjustments, equipment calibration following manuals, diagrams, and equipment specifications to avoid unwanted costly breakdowns or fatalities.

With reference to the excerpt above, the nature of lecturer learning through WIL was mentioned by Lecturer 16 at Company 3, who showed that they experienced learning from installation and maintenance procedures during their planned and unplanned maintenance duties. These procedures match reviewed literature (Tse 2010) that placements help develop practical skills through work procedures. The extensive list of tasks implied that lecturers were taken through several practical activities that suggest experiential learning through WIL. The installation and maintenance of electrical systems showed that lecturers were exposed to Kolb's concrete experience. Plant maintenance is a highly skilled process that needs considerable resources for unpredicted repairs and long-term planning for preventative plant maintenance (SSACI 2016a). From the comments by Lecturer 16, this type of maintenance was intended to maximise productivity and minimise costs. Central to this objective was avoiding unexpected breakdowns, which could incur massive costs in terms of production loss. The predictive maintenance was meant to safeguard the running life of the plant. There was also room for lecturer learning through WIL from the use of manuals.

Lecturers on WIL implemented a robust planned maintenance programme as a prime action that could reduce plant failure. While the nature of learning through WIL seemed similar throughout different companies, the use of different experiential learning techniques and diverse learning opportunities and experiences could provide some benefits (Kolb 1984; McLeod 2017). The interview extract below represents mechanical fitter and turner Lecturer 6 at Company 2:

We were maintaining machines and machining shafts as per the sample. I used to juggle between the two sections: the one day, I will be with the fitters and the other day, with the turners at the workshop.

Mechanical Lecturer 9 at Company 2 also explained:

We did daily routine maintenance to check if the machine filter was not stuffed with dirt. I write it down on the machine that a belt was changed, which will help the engineers and technicians see the machine's belt life before changing it.

Both Lecturers 6 and 9 experienced learning through WIL through routine maintenance, which involved repairing dysfunctional machines. Lecturer 6 experienced learning from stripping machines and replacing worn-out parts. Verma and Ramesh (2007) described routine maintenance as an effective strategy of minimising operation costs and maximising plant availability since downtime can be costly. Lecturer learning through WIL probably reinforced understanding of practical skills by doing tasks repetitiously while avoiding unwanted plant stoppages. As propounded by Bergami and Schuller's model, the routine work is aligned to the period of adaptation and adjustment to the host company's culture. Routine maintenance is generally known as scheduled preventative maintenance, which predicts possible machine failure and corrects it before it occurs, avoiding downtime.

When lecturers attended a breakdown, this was unplanned maintenance where they repaired the non-functional part or made a replacement according to their diagnosis results during the attachment period. Through this exercise, the nature of lecturer learning during WIL related to how the tools were used and procedures to strip and assemble machines. The findings match what is evident in the literature (Ahmad and Rashid 2011), reflecting that lecturers experience learning when exposed to various work areas like technical, maintenance, and operation, making them conversant with industry needs. Kolb posits that individuals construct meaning from their experiences (Kolb 2014). From the literature, practical industry experience allows lecturers to take a closer look into the world of work and to be able to adjust learning materials to industrial needs (Bukit 2012).

There was some experiential learning through the replacement of worn-out machine parts. Lecturer 9 probably learnt from changing bearings to facilitate rotation and reduce friction between moving parts. Unlike Lecturer 5 at Company 2, who rotated around different plant areas to attend to unplanned maintenance, fixing different plant pumps on one day and then another day working on planned plant maintenance to fix gearboxes.

Civil engineering Lecturer 14 at Company 1 commented on new skills learnt during WIL: *"I do a site inspection and take measurements to check correctness … calculation of cost estimate and adjusting of design drawings …"*. Site inspection involved a visual inspection in determining the structural integrity of the common key areas like the building sizes against the drawings. As highlighted in the response, the cost estimate involved forecasting and calculating the cost of building the structure, so Lecturer 14 checked if the project was moving in line with the budgeted costs. From the narration above, the nature of learning experienced by Lecturer 14 was through making estimations, adjustments and ensuring material availability on-site. The adjustments may have been necessitated by repeated part failure, which called for an improved design. Therefore, learning became a continuous process when adjusting design drawings (Kolb 1984) by searching for new information and processes to address the problem.

Taking measurements provided a learning opportunity for this lecturer through practice during WIL by checking contractors' accuracy as per approved working drawings. Lecturers 6 and 14 concurred on checking readings and taking measurements as both actions aimed at maintaining the accuracy of the processes. Calculations and adjustments of this nature are usually carried out using the software. Thus, lecturers learnt through software to calculate cost estimates and make drawings adjustments as per design engineers' recommendations. This suggested learning through engagement in doing the actual work – learning through practice. Further to the above comments, Lecturer 14 added:

> *I check on-site and place orders of material needed. I make bookings for construction plants. Doggy contractors can manipulate your little knowledge by using cheap or wrong material like casting concrete on the road edge instead of putting concrete curbs which are durable and recommended. They take shortcuts taking advantage of your little experience.*

From the responses above, the nature of TVET lecturer learning through practice during WIL included learning by making bookings for hired equipment. In this case, the TVET lecturer on WIL got learning through exposure to the corporate work to liaise and negotiate with service providers. By placing a purchase order for material, Lecturer 14 purchased construction material from external suppliers, setting forth the required descriptions and quantities. This process is likely to have provided some learning. At the centre of Bergami and Schuller's model is knowledge and skills acquisition, where new learning ensues and new skills are acquired (Bergami and Schuller 2009). The TVET lecturer on WIL analysed the material on-site, which involved booking construction plants, identification of the construction material for use at the site. Checking material on-site seemingly assisted the lecturer on WIL to ensure that material was always available and in adequate quantities. Indeed, Sahari, Tinggi and Kadri (2012) concur that the right quantity and quality of material and equipment must be easily specified, obtained and made available when needed. Hence, the TVET lecturer also learnt from ordering material when it was needed. Kasim *et al.* (2012)

support that inventory management is vital because poor management could increase costs and contribute to schedule and project delays.

The lecturer learnt from making purchase orders for material and from booking construction plants. Lecturer learning through WIL was often compromised by experienced contractors who capitalised on the lack of requisite skills on the lecturer. The lecturer learnt about inappropriate and inferior quality materials and methods used to minimise costs. Doggy contractors tended to avoid the correct way of carrying out processes to cut their costs, which compromised the final product quality, increasing risk to end-users. The nature of lecturer learning through WIL also involved keeping an eye for such practices, checking building materials and their fitness for purpose. Lecturer 14 also referred to learning by booking construction plants in the construction industry, which was necessitated by the need for specialised plant equipment. Such equipment was generally hired because it was only used in specific instances, such as lifting heavy pieces to greater heights. Subsequently, the civil engineering lecturer was able to apply knowledge to practical situations and gained new knowledge and experience (Dewey 1938; Kolb 1984).

Lecturers on WIL in this construction industry had exposure in different industry sections while learning through practice. Unlike Lecturer 14, who worked on different areas of civil engineering plant, the plumbing foreman at Company 1 explained what lecturers learnt during WIL, saying: "*They learn installation, modification, maintenance, and the repair of plumbing fittings for drainage and water systems, fitting and repair of sanitation systems like bathtubs, showers, toilets, and sinks" (Foreman 2).* In this civil engineering context, installation refers to fitting facilities into the building to make it ready for use. Through modifications, the plumbing lecturer made alterations to an existing system or structure. Consequently, some learning occurred when civil engineering lecturers installed, modified and repaired fittings and sanitation systems and used plumbing tools and equipment. Clayton (2013), concerning Australian TVET lecturers' industry knowledge and skills, highlighted that plumbing specialist lecturers learnt through practice how to keep their skills abreast with industry needs. At Company 1, I observed Lecturer 11 working on new installations and maintenance, installing geysers and connecting water systems, suggesting some learning during WIL. Civil engineering lecturers had concrete experience from working on installations.

From the above discussion, the nature of TVET lecturer learning through WIL involved planned and unplanned maintenance and repair, using drawings and manuals, modifications and installations, taking measurements, fabrication and learning to follow correct procedures. Some mechanical industry participants learnt from different workstations, while the mechanical and civil engineering lecturers experienced learning from software during their WIL. Mechanical engineering trades often had repetitive work, which seemingly helped to reinforce what they learnt. Civil engineering tasks were diverse, including learning from installation, making purchase orders, booking equipment and adjusting design drawings. Therefore, adjusting design drawings and modifications was done by searching for new information and processes to address the problem (Kolb 1984). The mechanical and civil engineering lecturers learnt from measuring, inspecting and checking processes and designs correctness. The routine nature of work contrasted significantly with lecturer expectations, as they needed to gain industry experience. A discussion on the documents of practice that were used in the maintenance procedure follows.

6.3.2 Learning through documents of practice

Fourteen TVET lecturers' learning through practice during WIL was also through documents of practice which guided their work. The documents of practice, in this case, included job cards, logbooks, manuals and work schedules. During maintenance, the artisan needed to have instructions about the task to be attended. The following interview extract from one lecturer in the electrical industry at Company 3 illustrates learning through a job card: "*Our supervisor receives a job card explaining what we are going to do and where? How many hours and personal protective equipment (PPE) we need?" (Lecturer 3).* Similar sentiments were echoed by mechanical Lecturer 9 at Company 2, who explained:

> *We use a job card to attend to a problem on the machine. If you do not attend the job card, the operator will record that no maintenance was done, which might cause conflict between the operations and workshop maintenance team.*

Responses by Lecturers 3 and 9 concur on the use of a job card at mechanical Company 2 and three other electrical companies. The job cards contained information on the job and details about what needed to be done, expected completion time and resources needed to ensure the job was successfully and safely completed. The supervisor also used a job card to keep track of assigned tasks and time spent on tasks. The findings align with a study on the development of a job card for mechanical maintenance which explained that a job card is a type of user instructional support that provides short explanations on the step-by-step procedure for a job, and gives detailed specifications on the material and equipment, and how a particular task should be performed (Patankar and Taylor 2017). In other words, it provided a guideline to work. The findings of this study dovetail with the study conducted by (Dong and Kim 2018), which states that users found the job card to be a very useful information source. Therefore, engagement on the tasks and processes outlined on the job card provided lecturer learning through WIL. Lecturers also learnt from retrieving essential information about the job and identifying the relevant tools for the job.

There were common responses from lecturers learning through WIL regarding the issuance of job cards. The majority of participants (18) showed that a job card was issued in the morning meeting to artisans, who interpreted details to TVET lecturers. It was noted that delays in attending to job card demands could create tension between the operators and the maintenance team. In this scenario, lecturers learnt that a maintenance task call needed minimum delays to maintain harmony between divisions.

The above remarks from lecturers were supported by the industry personnel like Training Manager 2 at mechanical Company 2, who said:

> *Job cards are issued to artisans as team leaders. Lecturers are assigned to artisans who give them sub-tasks to do. The lecturers' responsibility is to make sure tools are taken to and from workplaces and jot notes for future reference. Supervisors prioritise work on specific jobs and direct artisans to work on it.*

Artisans were team leaders who delegated subtasks to lecturers learning through WIL, for example, collecting and packing back tools. The TVET lecturer experienced some learning on how tools are stored. Bergami and Schuller's model states that new learning ensues as the lecturer faces industrial exposure, where they learn practical skills, putting theory into practice (Bergami and Schuller 2009). Even though a job card was available, the supervisor's decision took precedence by prioritising specific tasks over others to serve crucial operations. Lecturers' learning emanated from carrying out tasks, managing tools and writing notes on the activities. At a morning meeting at Company 2, I observed the distribution of job cards to artisans and the manager, explaining how the tasks were to be done.

The findings confirm what Training Manager 2 said about team leaders prioritising work. During data generation, I observed that each company used different terms to describe the documents of practice. Some companies used the term work schedule instead of a job card, yet they all served the same purpose. The comments from Lecturer 16 tally with Training Manager 2 at Company 2 that the job card was discussed to guide lecturers before attending the tasks outlined. Fourteen TVET lecturers across all companies reported experiencing learning by carrying out tasks and processes outlined in the job cards. Lecturers also indicated that they learnt through the artisans' guidance, who explained and delegated subtasks. Furthermore, lecturers seemingly learnt that a maintenance task call needed urgent attention to maintain harmony between departments. Consultation was noticeable through the job card, as TVET lecturers discussed the job card instructions with artisans, which showed the sharing of information and ideas. All industries were guided by a work schedule that served as a guideline and record of events from the findings. The next section discusses learning through diagnosis and troubleshooting.

6.3.3 Learning through diagnosis and troubleshooting

Eight lecturers on WIL experienced learning from troubleshooting and diagnosis, which generally identifies problems arising from a part failure by analysing and examining a machine's signs and symptoms. Lecturer 2 from the instrumentation and electronics industry at Company 3 responded: "*I learnt calibrating skills, soldering skills, troubleshooting skills. We learnt to open machines, fix and assemble back all parts in their original positions".* Lecturers were also involved in calibrating instruments' accuracy by collating their readings with standard measurement. According to Kolb (1984), lecturers had hands-on, new experiences and challenges through practice during WIL. Soldering[8] is a skill that a lecturer uses to replace malfunctioning components in circuits when calibrating. Thus, the instrumentation lecturer learnt from how the electrical components were restored to their working conditions by standardising them. I observed Lecturer 2 working on instruments which suggested experiential learning through calibrating, soldering and troubleshooting. In line with the 2009 model by Bergami and Schuller, TVET lecturers seek to acquire new knowledge and skills through the industry placement process. Kolb's theory also confirms learning to solve problems by thinking, doing and using learning to find solutions to practical tasks.

[8] Generally, soldering is a permanent method of joining pieces of metal together using a low melting point bonding agent called solder and a soldering gun.

Explaining their learning through WIL, a lecturer at Company 3 added: *"We helped with troubleshooting and repair of electrical connections and components" (Lecturer 16)*. In addition, Foreman 3 in the electrical industry at the same company had this to say: "... *diagnose malfunctioning equipment like transformers, motors, and lighting fixtures, test malfunctioning machinery, using test equipment, and discuss malfunction …"*. Lecturers learning during WIL was through the diagnosis of malfunctioning systems. A breakdown occurred when a bearing ceased on an electric motor, and it had to be replaced. The diagnosis was achieved using testing equipment and hand tools, which showed that lecturers used hand tools to locate faults on equipment. This study concurs with a study by (Khuzainey *et al.* 2020), which voiced that vocational teachers could explain troubleshooting and the step-by-step practical processes and describe the latest technology found in the industry. The current study supports the study of Fjellström (2014), who highlighted that students engaged in problem-solving tasks to find solutions to emerging problems. Findings from this study concur with Subbiah *et al.* (2017), who highlighted that industry training provided an opportunity to learn problem-solving and critical thinking skills. Furthermore, a study by Renganathan, Karim and Li (2012) showed evidence that students executed problem-solving activities during their industrial internship programme. Therefore, TVET lecturers had hands-on, new practical learning experiences during WIL.

The response of Foreman 3 confirms what Lecturer 2 at Company 3 said about calibration and diagnosis of equipment using tools. Foreman 3 further stated that there was the use of testing equipment in the diagnosis process. Lecturers and industry personnel suggest that lecturers' learning through WIL was through diagnosis and troubleshooting on some systems. The diagnostics and troubleshooting discussion suggested that TVET lecturers learnt by finding faults and repairing equipment during WIL. It appeared that only electrical and mechanical industries did fault-finding (troubleshooting) and diagnostics because of the nature of the industries. The next section looks at learning through fabrication and machining processes.

6.3.4 Learning through fabrication and machining processes

TVET lecturers learning through practice during WIL also involved a variety of activities in the industry. Machining[9] involved shaping, cutting profiles and removing material from a workpiece using specially designed tools. The definitions reflected machining as a manufacturing process encompassing a broad range of technologies, machines and techniques. Explaining their learning experiences on a typical working day, Lecturer 4 at Company 2 said: "*... fabrication of different components was done. I did gouging, repair and maintenance work on feeders and used drawings".* Generally, the gouging procedure is a welding process where boilermaking lecturers created a groove on metal using a gouging rod. The TVET lecturer had practical experience through fabrication, where they were welding and carrying out maintenance repairs and interpreting and using drawings. In line with Kolb's theory, Lecturer 4 experienced the first stage of the experiential learning cycle, which is about the concrete experience - the actual performance of the work through fabrication and maintenance. Another mechanical lecturer in welding at Company 2 mentioned:

> *We cut, fabricate and assemble metal structures and equipment by welding and shaping to customer requirements. We set up the welding machine, read and interpret drawings and follow welding procedure specifications. I learnt how to use various welding techniques like TIG, arc, oxy-fuel and argon (Lecturer 7).*

From the quote, the nature of TVET lecturer learning was experienced through fabrication during the WIL attachment period. In this case, the participant experienced learning from welding some engineering components together. The TVET lecturer on WIL also experienced learning from reading welding procedure specifications which they had to follow in the welding process. The learning further involved welding methods like Tungsten Inert Gas (TIG), oxy-fuel and argon gas welding.

Learning for lecturers on WIL was through hands-on experiences with the welding equipment, processes and procedures, and the assembly of fabricated structures. Observing Lecturer 4 at Company 2, I noted hands-on work on boilermaking developments, welding, gouging, measurements and cutting, which was consistent with the response by Lecturer 7 above. Generally, a drawing development is a pattern for pipes, elbows, boxes, ducting and

[9] Machining is a process of removing material from a workpiece using power-driven machine tools to shape it into an intended design (Thomasnet.com, 2019).

hoppers on the sheet metal before the shape is cut out and folded. Their hands-on engagement is described by Kolb (1984) as the direct practical experiences that learners go through when involved in an activity. Certainly, the lecturers gained knowledge by experience. Reviewed literature confirms that lecturers who engaged in learning through WIL updated their skills and knowledge through new equipment, tools, materials and technology (Clayton 2013).

TVET lecturer learning through WIL was also reflected by fitting and turning Lecturer 15 at Company 2, who explained his learning thus: *"Computerised Maintenance Management Systems and MS Projects are used to guide daily tasks. We also learnt a new skill to use this programmable machine"*. Lecturers also experienced learning using a variety of computer software which were preloaded onto the production manufacturing technologies. Microsoft Project offered some learning, a management software package designed to help develop work schedules, allocate resources to tasks, check progress on tasks, and calculate worked hours. From the above response, it appeared that using this software was a new skill that lecturers experienced during WIL. The response by Lecturer 15 is consistent with the literature from Tse (2010), which put forward that industrial placements help to develop practical skills through activities like using the software. According to the theoretical model by Bergami and Schuller (2009), the first stage of teacher industry placement is when the lecturer needs to acquire new knowledge and skills for the first time. Hence, Lecturer 15 learnt a new skill and fulfilled the first stage of the model. Another mechanical lecturer at Company 2 reported learning through WIL from performing a range of tasks as follows:

> *I did different tasks like structural work of a roof truss, boat repair…. I did marking off and layout, computer numerical control (CNC) lathe for the first time, check dimensions cut by CNC. I did arc welding and fabrication (Lecturer 4).*

Through practice, the nature of TVET lecturer learning was from performing a wide range of fabrication activities to making different shapes from metal using welding and CNC machines. The TVET lecturers went through the second stage - industry placement experience on Bergami and Schuller (2009) model, where they experienced various industry processes and different equipment in the company. Lecturer 4 experienced learning by repairing large vessels like boats which seemingly exposed them to a wide range of skills in boilermaking. Due to its nature, CNC[10] often increased the manufacturing process's automation level, which improved product quality and speed. Astro Machine Work (2017) explains CNC machining as a manufacturing process on grinders, lathes, and milling machines where pre-programmed computer software dictates tools' movement. In this instance, the TVET lecturer used automated machinery, the latest technology used in some industries, to perform tasks. The literature surveyed (Marope, Chakroun and Holmes 2015) notes that TVET professionals worldwide need WIL to get the generic practical skills, knowledge and competencies that lecturers should possess to deliver TVET programmes. Another source agrees that lecturers are exposed to what happens in the workplace for the first time, enabling them to see new technologies and the differences between their textbooks and actual practices (Smith 2016a).

When I observed Lecturer 4 in the mechanical boilermaking industry at Company 2, the lecturer stood alongside the artisan operating the machine. Later, I observed that the same lecturer used CNC under very strict supervision by the artisan. The lecturer first learnt from observing the experienced operator and practicing by imitating what the operator had demonstrated. According to Kolb's theory, a person cannot learn by merely observing but through participation in the experience to learn from it (Kolb 1984). The practice on CNC confirms that the TVET lecturer was exposed to the technologies through experienced operators' guidance. My observation tallies with reviewed literature that lecturers are involved in production in a supervised way, rather than allowed to do things independently, and also that companies needed a long time to gain trust and proof of competence in lecturers before allowing them to work independently (Van der Bijl and Taylor 2016). In agreement, Bergami and Schuller (2009), in the second stage of their model, indicate that irrespective of the type of industry, a lecturer encounters a period of adaptation and adjustment to the host company practices where they learn through observation and imitation, as was the case with Lecturer 4. McLeod (2013) expands Kolb's theory, saying that lecturers clearly explain and understand information through observation before a practical opportunity.

[10] CNC stands for computer numerical control which means that the machines can be programmed to cut the required profile in automation.

The TVET lecturers also seemed to have experienced learning through automation and the use of the latest technology. A lecturer from fitting and turning trade at Company 2 reported:

> *The activities included tool grinding, tool setting on the machines, straight turning, thread cutting, drilling metal, making flanges. I worked in different sections to assist depending on the demand for work (Lecturer 5).*

The fitting and turning lecturer learning through WIL was through different machining processes. The response suggested learning by doing different tasks in the different sections that the lecturer visited. From the response where the demand for work was low, the TVET lecturer had limited learning experiences. The nature of learning experienced by Lecturer 5 is consistent with the literature (Muchemi *et al.* 2013) that industrial attachment provides opportunities for working with equipment and tools, therefore contributing to production and industrial processes. In these circumstances, the lecturer could be seen as someone making a meaningful contribution to the host firm. The placements should ideally occur at regular intervals to keep the skills alive and relevant. According to Kolb's theory, a person must actively participate in the experience to learn from it (Kolb 1984; McLeod 2013). Industrial attachment refers to on-the-job training in which individual lecturer experiences learning while working in the industry environment, using the actual tools and machines to do the job (Khuzainey *et al.* 2020). This literature is in line with Bergami and Schuller's model that lecturer WIL placement exposes them to experiences which should result in benefits to all parties involved, lecturer on placement and the host company as mutual engagement would create an ideal context for knowledge and building required practical competence (Bergami and Schuller 2009).

From the discussion above, the nature of TVET lecturer learning involved engaging in processes such as fabrication, welding, fitting, machining and assembling metal structures and equipment. Lecturers experienced learning in different sections. Some lecturers learnt from CNC lathe and MS Projects. Hence, they experienced advanced and automated technology. During my observation of Lecturer 4 at Company 2, initially learnt through observation and later imitating actions under strict supervision by the experienced artisan. From Kolb's second stage of reflective observation, a lecturer pays close attention to understand the experience and find meaning behind the experience (Sharlanova 2004; Kolb 2014). TVET lecturers were exposed to different industry sections, for example, boilermaking, welding, fitting and machining, and benefited from some practical experience.

Both boilermaking and fitting trade lecturers experienced learning through using machines and carrying out engineering processes, which enhanced learning through WIL. Lecturers learnt fabrication, welding, fitting and machining skills, thereby passing through Kolb's stage 1 on concrete experience. Lecturers experienced learning from using different types of automated machines. Their learning was centred on the use of machines. The next discussion focuses on lecturers learning using machines and equipment.

6.3.5 Learning through the use of machines and equipment

Experiential learning in the industry was based on the use of different machines and equipment. Six lecturers experienced learning from machines and equipment from the eleven participants. The other five were industry personnel who confirmed that lecturers experienced learning from using machines. Mechanical Lecturer 6 at Company 2 said: "*Before using machinery, artisans introduce the machines and show all the controls and operations on a short course".* The lecturers experienced learning from using machines and from machine parts and their functions. Lecturer 6 observed how to use a machine before laying a hand on it.

Lecturer 1 from civil engineering at Company 1 also reported learning from using machines: "With the help of my supervisor, I used vibrating machine, grinder, drill, mobile concrete mixer, bar bending, plastering machine and automatic tiling machine". The mechanical Training Manager 2 at Company 2 also explained: *"They were trained and introduced to all machines. They were taken on a short course to show them how the machines are operated".* In a similar vein, Training Officer 1 at civil engineering Company 1 said: "*Before any new person starts work at a company, they must be trained for all equipment so that they will not hurt themselves"*. There was agreement that lecturers using machines during WIL learnt through induction as indicated by Training Manager 2, Training Officer 1 and Lecturer 6. Drawing on Kolb's theory, this is consistent with concrete experience and practical exposure where lecturers learnt new experiences (McLeod 2013). The TVET lecturer learning from using equipment during WIL was preceded by training on using machines. Discussing how lecturers learnt to use machines, Training Manager 1 at Company 1 also stated: *"We use our qualified operators and artisans to train them on how to use machinery and tools correctly".* In this company, qualified and experienced artisans trained lecturers. It would appear that the company personnel implied a situation where lecturers were introduced to industrial equipment and given some company information. Literature studied (Govender and Wait

2017) describes significant WIL benefits through induction, where lecturers are introduced to the equipment, working teams, and allocated tasks and responsibilities.

From the discussion above, some lecturers during WIL learnt from training how to use machines before they used them, as confirmed by company personnel. Lecturers were introduced to machinery, thereby preventing personal injuries and damages to expensive equipment. It emerged that both civil and mechanical trades lecturers received training before using machines. The following section discusses lecturers' learning through meetings in the industry.

6.4 LEARNING THROUGH MEETINGS

During the meetings, lecturer learning emanated from interaction and sharing experiences and ideas. A meeting is described as an ad hoc or pre-arranged opportunity for purposive communication, where a group of people congregate with a shared identity to discuss current updates, task progress, challenges and address a common goal (Freeman 2010). In this context, meetings involved artisans, supervisors, engineers, managers, and lecturers to ensure that tasks were performed according to specifications outlined in the working document of practice. Data shows that TVET lecturers on WIL gained experiential learning through: collegial section meetings, status update and action review meetings, and information sharing meetings discussed below.

6.4.1 Collegial section meetings

Table 4 above shows that 15 lecturers learning through practice during WIL. Their learning was through meetings, which seemingly reinforced employees to stay connected. Eighteen participants confirmed that there were collegial section meetings held. The nature of TVET lecturer learning through meetings was reported in their sections (civil, electrical and mechanical) which dealt with matters pertaining to the division. The civil engineering industry divisions were bricklaying, surveying and plumbing, while in mechanical engineering companies, they included boilermaking, welding, fitting and turning and maintenance. Electrical engineering had installation and maintenance. According to Tracy and Dimock (2004), meetings are the primary communicative practice organisations use to accomplish goals, make changes, and develop new ideas. Bergami and Schuller's model confirms that a TVET lecturer on placement will have access to various networks and channels of information that will provide valuable insights and feedback about new or improved industrial processes and other forms of organisational knowledge (Bergami and Schuller 2009). In meetings, plans were made, problems were solved, and critical organisational decisions were taken (Cohen *et al.* 2011). A typical division would include people with similar background knowledge to speak the same technical language and resolve issues arising in that division.

Language and vocabulary were essential for verbalising and discussing what lecturers perceived and understood about their experience (Sharlanova 2004; Kolb 2014). Literature confirms that the TVET lecturer fully integrates the language of the field (Blom 2016b). A recent study by Ramamuruthy, Alias and DeWitt (2020) showed that there was a lack of technical language communication skills by trainees in the industry as they failed to communicate using appropriate technical terminologies. A discussion about meetings with welding Lecturer 7 at Company 2 stated that:

> *I learnt that it helps to communicate with colleagues and supervisors to share ideas and exchange information. You get inspiration from a meeting to hear how someone finished a difficult job. You get to be known by supervisors.*

According to TVET Lecturer 7, department meetings[11] offered opportunities for their learning on WIL through dialogue with supervisors as a two-way communication process where they learnt from discussions. This is signified by the phrase "communicate with colleagues and supervisors" in the excerpt above. The sharing of experiences through the meetings motivated and inspired the participant on getting tips to accomplish tasks. The TVET lecturers shared experiences through discussions and learnt through association with the team. Explaining meetings, Lecturer 10 from the refrigeration industry at Company 2 commented:

> *Meetings promote relationships and unity in the organisation through interaction. In a meeting, you share knowledge and skills and coordinate activities to be undertaken. We pass and receive information and reports clarifying areas of importance.*

Lecturer 10 confirmed that meetings promoted working relationships through communication and knowledge sharing. The above excerpt explains a characteristic of Kolb's theory that

[11] Meetings may provide a forum for answering questions that help facilitate work activities (Allen, Sands, Mueller, Frear, Mudd & Rogelberg, 2012).

learning involves transactions between the lecturer and the environment (Kolb 1984). Lecturers learning through WIL also gained information sharing where artisans probably clarified vital information to lecturers. In agreement, the civil engineering Training Manager 1 at Company 1 reported: *"Meeting gives personal support to each other when we meet and exchange ideas. A group can analyse and improve ideas through a meeting"*. It appeared that meetings lead to a productive 'give and take' of ideas.

From the discussion, there is evidence that lecturers on WIL interacted and shared experiences, information, and ideas through meetings. Across all companies, lecturers learning through section meetings during WIL maintained relationships and unity in the divisions and eventually at the workplace. Lecturers received tips on how tasks were accomplished. The next section addresses the status update and action review of meetings.

6.4.2 Status update and action review meetings

Seven TVET lecturers were also involved in status updates and action review meetings which provided a platform for learning in industry. These meetings were planned and structured evaluation or debriefing sessions which discussed what happened, why it happened and what could be done better in the future (Kolb 1984). At this stage, lecturers compare what they have done and what they already know from textbooks and past knowledge (McLeod 2017). The lecturer is also concerned with abstract concepts and excels in inductive reasoning (Kolb and Kolb 2009). An electrical Foreman, in an interview, pointed out that: *"The meeting discusses job cards, and the charge hands explain how tasks are accomplished"* (Foreman 3). In this instance, a review of a completed task was carried out, which promoted lecturer learning. From the meeting I observed at Company 3, job cards were signed off and closed on completed tasks. The status of outstanding tasks was discussed, and TVET lecturers experienced learning from an outline of possible solutions to incomplete jobs during such meetings.

Lecturer 12 from the mechanical industry also had this to say about their learning through meetings: "*The meetings are helpful in the sense that it is an opportunity for feedback and it is an opportunity for me to air out views on the training"*. TVET lecturers reported learning from the feedback shared with colleagues, where they also had an opportunity to share their views. Feedback provided a platform for lecturers to receive comments and criticism from artisans on their performance and had a chance to air out views and express their standpoints on tasks. In this case, Kolb in McLeod (2013) refers to people who listen with an open mind to receive personal feedback. Such meetings often enabled TVET lecturers to build confidence and the ability to state their opinions without fear of criticism from experienced artisans, managers, and other colleagues.

The status update meetings involved an evaluation of work done as reflected in the working documents. An evaluation occurs by reflecting on the experience, which helps the lecturer acquire a more profound understanding of the experience from it (Kolb 1984; Clark, Threeton and Ewing 2010). The meetings were frequent in civil engineering and mechanical maintenance industries, where they made constant reference to job cards and job specifications. Through the review meetings, lecturers had an opportunity to put forward their views, learn from feedback on their performance, and explain tasks to charge hands. The nature of lecturer learning through practice during WIL was also experienced from information-sharing meetings explained below.

6.4.3 Information sharing meetings

The information-sharing meetings included morning meetings, and they were also conducted at any other time when information had to be disseminated. Eight TVET lecturers learning through practice during WIL involved information sharing as explained by the civil engineering lecturer at Company 1: *"There are morning meetings to discuss the daily schedule[12] about the tasks to be done on a day" (Lecturer 1).* These morning meetings were held before the commencement of work to explain and share the daily work with team members. Lecturers learnt from the discussions of daily work by artisans, which offered them insights and focus.

Learning through information sharing occurred at site meetings, as reported by another lecturer in the civil engineering industry. A site meeting is an informal technical work meeting held regularly to discuss critical issues. It aims to solve site glitches immediately. The lecturer said: "*Daily, I attend site meeting, do inspection and issue job instruction" (Lecturer 14).* Civil engineering included bricklaying, plastering, plumbing, roofing and

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[12] A schedule is like a roster bearing the name of the employee in charge of the task to be performed and the description of the type of task.

carpentry; thus, site meetings were common. Site meetings were planned gatherings at construction sites where lecturers learnt from stakeholders when they checked work in progress, addressed challenges about possible work hazards, and ensured compliance with building standards. Site meetings checked if all specifications were adhered to and that everyone working on-site used PPE. Research literature confirms that: "Site meetings[13] are typically the arena in which designers, engineers and managers co-create and develop new design solutions, give feedback to each other and jointly discuss design-related issues" (Mäki 2015: 231). During data generation, I observed one such meeting at a building site, as indicated by Lecturer 14, where lecturers on WIL, artisans, technicians and engineers shared information. Through inspection and checking during a site meeting, lecturer 14 indicated that work schedules and actual work were accomplished and analysed against standards to share knowledge and create better design details. Lecturer 8 from the civil engineering industry at Company 1 reported on information sharing meetings:

> *We meet daily for a toolbox talk. A supervisor addresses and shares daily tasks and speaks about safety hazards or incidents which occurred a day before to prepare us for the day. You get feedback, share information, experience and air grievances.*

Information sharing meetings in the industry included toolbox[14] talks as indicated by the civil engineering Lecturer 8. A toolbox talk is generally an informal and quick method of sharing information with colleagues before starting work. Toolbox talks occur while the staff is standing because it is a short briefing about important highlights and work to be done, conducted on-site before work starts. From the literature (Harrington *et al.* 2009), safety talks are described as toolbox talks. The finding is in tandem with literature (Khalid, Aslam and Khalil 2021) which suggests that toolbox talks conscientise workers to care for themselves and remind them to perform their tasks with due care (Hughes and Ferrett 2020). The meetings aim to surface all hazards associated with specific tasks and discuss them according to the work on site. A lecturer from the mechanical workshop added*, "Communication, sense of belonging and openness were learnt from the meetings*" (Lecturer 15). Training Manager 2 added: *"Meeting is a good platform to hear what people have to say".* Through verbal

[13] Oke, Mavimbele and Aigbavboa (2016) describe site meeting as one of the oldest and current way of managing problems originating from construction projects and enforcing quality standards.
[14] From another perspective, toolbox talk can be defined as informal work-site training designed to deliver safety messages to improve safety and prevent work-related incidents (Varley & Boldt, 2002).

communication, TVET lecturer learning through information sharing meetings during WIL involved exchanging information, ideas, and thoughts through dialogue and discussion. A sense of belonging nurtured excellent communication and focus on the same goal. I observed at Company 1 that skills were reinforced and concepts explained through meetings, enhancing communication. Communication in the industry was generally verbal during meetings and considered key since industry personnel had consensus during oral discussions, which created engineering knowledge (Darling and Dannels 2003). There was no evidence of meeting recordings that I noted from observation. Lecturers step back from work and review what has been experienced, and communication channels are opened to team members (Kolb 2014). Through communication, lecturers seemingly created a common understanding of their teams and shared their opinions and vision.

Lecturers had contact with experienced artisans, thus tapping from their expertise. Another electrical lecturer at Company 3 also added:

> *We share work experiences as colleagues and help each other improve on integrating theory with practice. I got experience in listening, communication, reporting skills and problem-solving techniques. I learnt to follow instructions and do the job correctly (Lecturer 18).*

The nature of learning for the attachees, as experienced by Lecturer 18, was based on experiences and getting advice from each other on improvement methods. Among the experiences that TVET lecturers gained from morning meetings were soft skills which lecturers learnt by following the correct steps during WIL. TVET lecturers were placed in different companies, where they communicated with their supervisors on how to solve problems, showing accountability and dependability.

TVET lecturer learning through information sharing meetings during WIL involved working as a team in the workplace, combining their skills to accomplish a task. Lecturer 1, Lecturer 8 and Lecturer 14 support responses by Lecturer 15, which showed that Company 2 experienced learning through information sharing meetings during WIL. Consequently, TVET lecturers on WIL formed close professional and personal ties with industry personnel. There was freedom of expression where lecturers could express their thinking, consequently learning from a free exchange of ideas. Also, lecturers on WIL presented unresolved tasks that they encountered while on duty, hoping for solutions from the rest of the team through verbal discussions. Through information sharing meetings during WIL, there was learning from shared daily programmes with all team members. The responses are consistent with Bergami and Schuller's model, emphasising collaborative engagement and industry networks (Bergami and Schuller 2009). Lecturer 8 confirmed what Training Officer 1 mentioned about sharing ideas and information. Kolb's theory is also applicable when people collaboratively work on a task, maintain relationships and dialogue to share, plan, problem-solve and agree on actions (Kolb 1984; Sharlanova 2004).

Lecturer 14 at civil engineering Company 1 commented: *"Meetings[15] provide direction on how things should be done".* Training Officer 1 indicated that team members were free to air their views. At the same time, lecturers were given the relevant information they needed to guide their work. The comment by Lecturer 14 was an admission that there was some learning through guidance on tasks. This finding is in tandem with Bergami and Schuller's model, which states that a lecturer is exposed to industry activities to learn new or improved industry processes (Bergami and Schuller 2009). The direction referred to operational guidelines followed in the completion of duties. From the response above, TVET lecturers during WIL learnt through mentoring from artisans. Training Manager 2 symbolically used a platform's image to portray an opportunity or space where they learnt and observed how the qualified artisans tackled tasks. Through observation, lecturers write short reports on what happened, give others feedback, complete their logbooks as they think through the experience and understand what has happened (Clark, Threeton and Ewing 2010; Kolb 2014).

The results showed that the civil engineering industry used site meetings to check adherence to all specifications. From all companies, TVET lecturer learning through information sharing meetings during WIL involved exchanging information, ideas, and thoughts through discussion or in writing. Furthermore, 15 lecturers confirmed learning through discussions on daily tasks, which enabled them to understand those tasks. Mechanical meetings were done indoors, while civil engineering meetings were conducted at the construction sites due to the civil engineering industry's nature, where most building construction tasks were outdoor activities. Information sharing created a conducive opportunity for lecturers' learning through WIL.

[15] Du Toit (2006) defines a meeting as an assembly of two or more people to discuss matters of mutual interest and ensure that these decisions are implemented.

An analysis of the response by Lecturer 8 expressed the following: Firstly, there was an emphasis on lecturer learning through daily meetings. Secondly, it was said that a meeting was used to share vital information and get feedback on outstanding work issues amongst the team, giving rise to learning. Thirdly, lecturers learnt from sharing experiences and used the same platform to air grievances. As a result, challenges were addressed on the one side, while experiences, good and bad, were also shared on the other side.

A whole range of issues was addressed during information-sharing meetings suggesting that lecturers during WIL experienced learning from the requirements and conditions of tasks. Lecturers learnt from daily schedule discussions, sharing others' feedback experiences, and carrying out inspections and safety hazards procedures. There was consensus among lecturers at all companies about learning through information sharing meetings. The following section discusses learning through reflection.

6.5 LEARNING THROUGH REFLECTION

TVET lecturer learning during WIL included learning through reflection[16], a flashback where one turns to check how events unfolded and learn from realising what they could have done differently. Korthagen and Wubbels (1995) define reflection as the mental process of structuring or restructuring experience, existing knowledge or insights. In this research, reflection is beneficial in experiential learning. Reflection is critical in developing critical thinking skills, facilitating integration between theory and practice. Therefore, TVET lecturers during WIL engaged in reflection to critically appraise themselves, the engineering operations and relationships with team members in the workplace (Boud, Keogh and Walker 1985).

Lecturers on WIL regarded reflection as a form of understanding developed from the puzzlement and discomfort they experienced from learning through practice. In this regard, Lecturer 3 at Company 3 commented: *"We had to look back and think of possible causes and find ways to improve the system"*. In other words, in reflection, the nature of TVET lecturer

[16] Cole, (1997) and Freese (2006) accept that reflection is a desirable attitude and practice to improve lecturers' experiential learning.

learning involved looking back at the experience, re-playing, for instance, the use of a machine, critically analysing it and asking such questions as what happened, why did things happen that way and who or what contributed to it and what could have been done differently (Gibbs 1988b; Korthagen 1999; Kolb 2014). A sub-theme that emerged from which the TVET lecturers on WIL experienced learning through reflection was reflection-on-practice. The sub-theme is analysed and discussed below.

6.5.1 Reflection-on-practice

Reflection-on-practice is the process of looking back and learning from reflection on the experiences to effect improvements or uphold good specific acts in future decisions and programme implementation. Learning through reflection-on-practice during WIL was experienced by five TVET lecturers. Kolb's ELT states that reflection refers to going back to the task's starting point and reviewing what was done (Kolb 1984). Literature sourced discuss reflection-on-practice as a deliberate activity which refers to thinking about the practical task outside its occurrence (Schön 1987; Day 1999). Thus, TVET lecturers looked back on particular practical experiences, their strengths, weaknesses and whether they had used appropriate maintenance, installation or troubleshooting methods by analysing where challenges emerged, considering how to overcome them, and determining the future directions of their practical experience. When used well, reflection enables learning, and within professional practice, it allows individuals to demonstrate their progression in achieving learning outcomes and required standards (Heyer 2015). New practical learning experiences appeared, leading to lecturers on WIL learning through reflection on what they could have done differently.

TVET lecturers reflected on the host company's practices and processes as they subsequently adopted ways to improve how to perform such processes. According to Bergami and Schuller's model on industry placement, a lecturer on WIL has an opportunity to reflect, deconstruct and reconstruct the workplace processes, thereby gaining new insights (Bergami and Schuller 2009). Learning through reflection on practice would involve analysing practical tasks, reviewing and recreating the experience of making meaning (Kolb 1984). The lecturer reflects on the experience before judging, giving particular attention to inconsistencies between experience and understanding (Kolb 1984).

Lecturer 7 at mechanical Company 2 responded, "…*we look back in terms of reflection and ask what the cause of a particular part to fail was".* The response showed evidence of reflecting or reliving experiences on completed tasks to determine the reason for a part or machine failure and what could have been done to accomplish the task. Through reflection-on-practice, the TVET lecturer on WIL defined the problem cause and made sense of it by reflecting on the situation. Reflection-on-practice allowed TVET lecturers on WIL to stand outside their practice, see what they did from a broader perspective, and consider alternative ideas and practices. For example, fault-finding was highlighted, which showed the time to check why a specific task could not be accomplished or why a particular part ceased to function. Lecturers must reflect on and observe their experiences from many perspectives (Kolb 1984).

Regarding the comments above, lecturers reflected on practice during WIL, identified the flaws in their work and learnt what they could have done differently and corrected in their subsequent practices. Kolb's ELT allows a person to think through the experience and understand what has happened (Kolb 1984). Furthermore, reflection occurred (Shulman 1987) when a lecturer reconstructed, re-enacted, or recaptured his duties' events and accomplishments. Looking back at what happened, the TVET lecturer could re-play and reframe experiences from a different perspective, leading to learning. Literature sourced outlines that lecturers should reflect to become effective and professional (Çimer, Çimer and Vekli 2013).

Reflection was also evident in the morning meetings at Company 2, *"...in terms of the meetings we consider what was done the previous day and if those tasks were accomplished without hardships, then we start on new tasks"* (Lecturer 7). Lecturer learning through reflection on practice reportedly developed by understanding how they could have performed specific actions in the industry. In search of what they could have done better, lecturers move to Kolb's next stage to get new ideas and modify existing processes (McLeod 2013). The reflection raised an understanding of professional judgment that enabled lecturers to explain the 'what', 'how' and 'why' (Shulman 1987; Gibbs 1988b). Similarly, reflection-on-practice involved identifying accomplishments within a situation to look forward to (Wain 2017). Thus, through reflection, lecturers learning during WIL would enable them to consider alternative ways of improving subsequent attempts. A plumbing lecturer from the civil engineering industry at Company 1 expressed about reflection:

> *When I get back home, I reflect on what I learnt today and refer to my material from the training centre to see what I did not do correctly and address my challenge. I have noticed that what you learn at the training centre is not necessarily done on sites (Lecturer 11).*

Regarding TVET lecturer learning from reflection during WIL, Lecturer 11 mentioned reflection on a completed job compared with theoretical principles in study guides. Reflection-on-practice highlighted by Lecturer 11 suggests learning from noting similarities and differences. Therefore, reflection increased awareness of experiences and allowed TVET lecturers to learn from the errors and make informed decisions.

Given that lecturers experienced learning through reflection on practice during WIL, this suggests reflective observation on Kolb's ELT stage two. From reflection, lecturers proceeded to abstract conceptualisation stage three, where they tried to make sense of and understand the practical experiences by thinking things through and assimilating knowledge (Kolb 1984). During WIL, lecturer learning also involved reflection on practice on the experiences to effect improvements or uphold acceptable practices in future actions.

Thus, six TVET lecturers in different industries reflected on practical tasks, their strengths, weaknesses and whether they used appropriate methods by analysing where challenges emerged, considering how to overcome them and determining the future directions of their practical experience. Lecturers identified flaws in their work and learnt what they could have done differently. Therefore, lecturers on WIL proceeded to abstract conceptualisation stage with new learning and new ideas from reflection. There was evidence of reliving experiences on completed tasks to determine the reason for the incomplete task. The following section discusses learning from teamwork.

6.6 LEARNING FROM TEAMWORK

Working in any industry requires the collaboration of a team of tradesmen as one cannot work in isolation. Fifteen lecturers acknowledged learning from teamwork during WIL. Teamwork calls for the collaborative effort of a group of lecturers and artisans to achieve a common objective. The teamwork would be crucial for TVET lecturers learning in industry as they would have to report to artisans and follow instructions on tasks. Teamwork was explained at Company 2, where a mechanical lecturer said: "Y*ou need a team to share ideas, tools and help each other because if you are alone, you cannot do everything. Someone has to* *crosscheck your work to make sure it is right" (Lecturer 5).* The civil engineering lecturer at Company 1 commented about learning from teamwork during WIL:

> *I need two or three labourers to assist me ... two for tiling and one for paving when bricklaying. Other trades like plumbers, electricians, plasterers and carpenters form part of the team I engage with to complete a good job (Lecturer 13).*

In support of the lecturer learning through teamwork during WIL, Training Manager 3 reported:

> *We have a 'buddy-buddy system' to work together when looking at safety to check if a person is carrying out the task correctly. Any deviation, you stop the person and highlight the unsafe act or redo an incomplete step.*

In agreement with the above sentiments, Foreman 1 at Company 2 explained:

> *After some months of training, they can work alone. Company policy stipulates that only qualified artisans can work without supervision. The buddy-buddy rule applies where they go in pairs so that they watch each other's back.*

The responses immediately above reflect collaboration from different people as evidenced by the following phrases: "buddy-buddy system" and "I need two or three labourers to assist me". The nature of learning through teamwork involved lecturers liaising with other tradespeople to complete tasks. Through teamwork, lecturers learnt by focusing on areas of specialisation to ensure job completion. From the responses, TVET lecturers experienced learning through respecting and valuing the contributions and viewpoints of team members. The buddy-buddy system, where colleagues were paired to work together and watch each other in safe work practices, also provided some learning. The system minimised unsafe work practices and prevented accidents by identifying and eliminating human error and negligence.

Teamwork involves working with different people in the same organisation or other organisations like material or machine suppliers to accomplish a common goal. As lecturers worked towards building collaboration, they learnt how to communicate and receive constructive feedback from supervisors and colleagues. Furthermore, lecturers in the electrical industry learnt to take care of each other to prevent incidents and mistakes. In all disciplines, lecturers reported working in teams, for example, in civil engineering and mechanical trades who were working on heights. Teamwork for lecturers in civil engineering also involved other electrical and mechanical trades, which broadened the spectrum. Lecturer learning from teamwork during WIL is also discussed below, under learning from networking.

6.6.1 Learning through networking

The nature of TVET lecturer learning through WIL emerged through networking. The network generally involved interacting with artisans, engineers and other industry personnel, developing and exchanging contacts and information. Nine lecturers confirmed learning through networking. In response to how TVET lecturers on WIL learnt through networking, *Training Manager 2* at mechanical Company 2 reported: "*Lecturers get most valuable skills in this professional setting through discussions with colleagues, mentors and networking with qualified artisans. They build good work ethics and follow the rules and protocols.*" Literature consulted (Raihan 2014) confirms that links are needed to improve networking between academia and industries, create a better understanding of everyone's needs and identify how they can be met through WIL.

Lecturers learning through WIL were connected with artisans from whom they learnt how to behave according to company principles and values. The findings dovetail with sourced literature stating that TVET lecturers on WIL updated their skills and knowledge by attending tradesmen events, conferences, seminars, and industry networks (Clayton 2013). Another mechanical lecturer echoed: "*Yeah, I meet with other people to see what is happening in the industry" (Lecturer 9).* The response reflected that the lecturer could meet industry personnel seemingly to share apt industry updates on technology developments. A mechanical Training Manager confirmed that: "*Lecturers got industry connections that update them on industry developments"* (Training Manager 2). The response is in line with researched literature that lecturers considered WIL necessary for developing networks and professional contacts (Bergami and Schuller 2009). Lecturer 9 and Training Manager 2 confirm the nature of TVET lecturer learning through networking. From the literature (Clayton 2013), rubbing shoulders with experts was viewed as a valuable learning strategy reflected by 11 participants in the study. Scholars such as Smith (2016b) agree that WIL helped lecturers develop their networks and relationships with employers. In support, sourced literature (Govender and Wait 2017; Kintu, Kitainge and Ferej 2019) further indicates that WIL increased networking opportunities and the development of useful contacts with industry.

The research responses align with sourced literature that lecturers gain innovative ideas to establish links with industry and socio-partners (Bergami and Schuller 2009; Clayton 2013; Muchemi *et al.* 2013). Bergami and Schuller's model aligns with the responses about industry networks stating that placement experience provides the TVET lecturer with opportunities for developing industry networks within the host company, which can be a powerful resource to maintain their industry currency (Bergami and Schuller 2009). In the next section, a discussion on lecturers learning from safety workshops follows.

6.7 SAFETY WORKSHOPS

Twenty participants showed that they experienced learning through safety workshops. From my observation, safety workshops were a common practice in all companies. Safety issues were generally regarded as essential during WIL as they organised training sessions where lecturers were conscientious about the safety procedures and work hazards to avoid incidents and fatalities during work operations. Safety refers to managing all operations and events within an industry to protect its employees and assets by minimising hazards, risks, accidents, and near misses (Mora *et al.* 2018). Generally, a near miss is a narrowly avoided accident. The safety matters are discussed under the sub-themes: housekeeping and safety talks and procedures.

6.7.1 Learning through housekeeping

A majority of lecturers (17) voiced that there was learning through housekeeping discussions. Lecturers learning through practice during WIL were attached to industries where housekeeping was a common phenomenon. I define housekeeping as putting order in a workplace with tools and equipment and keeping work areas clean and walkways free. Leino, Heinonen and Kiurula (2014) describe housekeeping as keeping work areas always tidy and ensuring no obstructions in passages, doorways, emergency exits and staircases. Failure to follow housekeeping rules often creates 'booby traps' or obstructions which sometimes lead to accidents. Generally, accidents occur due to negligence of PPE signs on safety and housekeeping, rotating machines, walkways, spillages and sometimes overhead objects like cranes.

Mechanical Lecturer 9 at Company 2 responded regarding housekeeping and said: *"At the end of the day, the workshop and tools must be clean after use. The next shift must find a clean workshop with tools back in their places"*. Lecturer 13 at civil engineering Company 1 responded about housekeeping: *"We clean up and take tools back to the storeroom, especially the expensive ones like the electrical tools. We put wheelbarrows, spades, levels and small tools in the temporary storeroom"*. The responses suggest that the nature of lecturer learning through housekeeping instructions during WIL involved taking charge of housekeeping duties. The lecturer also learnt about the safe and clean storage of tools after use and keeping a clean working environment. All dirty tools were cleaned before being returned to the storeroom. The mention of expensive electrical tools implied learning from taking extra care of expensive tools and putting them away preferentially. Through this exercise, the nature of the lecturer learning from housekeeping instructions during WIL involved an appreciation of the correct placement of tools.

Lecturer 13 confirmed the sentiments of Lecturer 9 that cleaning tools and keeping a clean workplace were important aspects. Housekeeping was identified as an ongoing exercise during WIL. During observations, I noted civil engineering lecturers cleaning the site, trowels, shovels and spirit levels at Company 1, as they all learnt from housekeeping. The observation aligns with other participant responses that workshop tools were cleaned after use.

Lecturers learnt from keeping a clean and tidy workplace at all times. They also learnt to place clean tools in their correct places after work. Civil engineering lecturers learnt from cleaning their tools daily, as explained by Lecturer 13, while the mechanical processes demanded cleaning floors to dispose of material produced by machining operations and wipe spillages. The next section discusses safety talks and procedures through which TVET lecturers on WIL experienced learning.

6.7.2 Safety talks and procedures

A safety talk was used to continually remind employees, including TVET lecturers, that safety was essential in the industry. Safety talks and procedures differ from morning meetings in that only safety issues are addressed, and they are conducted informally where no minutes are taken. Eight lecturers reported learning from safety talks and procedures during WIL.

Safety talks[17] showed workers' and employers' commitment to safety issues by setting expectations, increasing hazard awareness, and reinforcing safe working practices (Olson *et al.* 2016). Employers used safety talks to relay important safety information to all employees, lecturers included, before working during WIL. Safety talks and procedures would reduce injuries and improve safety if administered regularly to everyone on site. Indeed, safety talks played a vital role in reducing safety hazards in industry. Mechanical Lecturer 6 at Company 2 responded on how learning from safety talks and procedures unfolded: "Firstly, *we are reminded of the importance of safety. After that, we get updated on safety issues about behaviour, hazards and PPE".* A civil engineering Lecturer 8 at Company 1 also responded about safety talks: "*The safety officer spoke about safety hazards or incidents which took place a day before to prepare us for the day. Safety PPE is important in the construction industry".* The lecturer's comments align with Kolb's theory which recommends a concise and logical approach where people require a clear explanation of concepts rather than a practical opportunity. In this instance, safety protocols may involve complying with rules like wearing a dust mask and safety glasses at all times. Researched literature Van der Bijl and Taylor (2018) confirm*:* "There are many things that we somehow neglect, like the safety procedures that need to be in place before the job can be done". This is consistent with employer demands in companies that were explored.

The nature of lecturer learning was also through safety talks and procedures during WIL, which lecturers attended daily. TVET lecturers were reminded of essential safety tips during these safety talks, such as approaching tasks cautiously. When I carried out observations at Company 1 and 2, I noted that such meetings were brief and focused on safety aspects such as wearing appropriate PPE, following safety protocols like lockout procedure and using correct tools for a job. Lecturers learnt from identifying hazards in the workplace and the importance of safety to everyone in the company. Literature supports that safety talks are a traditional and potentially impactful form of supervisor safety communication in the industry (Olson *et al.* 2016). All responses about safety meetings implied that safety talks occurred daily in the industry, where lecturers on WIL were reminded about safety procedures and hazards to avoid fatalities. Checking the appropriateness of PPE entailed ensuring that

[17] In industry, safety talks are described as toolbox talks or safety tailgate Harrington, D., Materna, B., Vannoy, J. and Scholz, P. **2009**. Conducting effective tailgate trainings. *Health promotion practice*, 10 (3): 359-369..

everyone wore appropriate clothing. Lecturers 6 and 8 confirmed that they learnt from the daily safety incidents and procedures and from using PPE. From my observation, engineering companies conducted safety talks every morning to alert everyone about safety protocols and any incidences before they started work.

During the interview, engineering Foreman 1 at Company 2 said: *"We discuss safety talks daily, health issues, especially this winter flu, outstanding and complete jobs, closed jobs …. We discuss and report on work"*. The civil engineering Training Officer 1 at Company 1 was emotional about safety issues and said: *"Yes, lecturers must identify hazards in their working areas ... because the construction industry can be dangerous"*. Foreman 1's response noted the importance of lecturers' health while on WIL and cautioned them to take precautionary measures. Through safety talk discussions, lecturers learnt how to report safety hazards since accidents seemed prevalent in the construction industry.

The safety issues align with Olson *et al.* (2016) that there are many fatalities in the construction industry due to negligence, falling from heights, equipment failure and structural collapse. Thus, the TVET lecturers learnt from identifying workplace hazards and unsafe acts and preventing human error and negligence in the workplace. Lecturer 8 and Training Officer 1 confirmed TVET lecturers' learning from safety talks and procedures and identifying hazards. Furthermore, during observation at Company 1, they even played video clips on safety hazards and fatalities to conscientise lecturers about safety procedures. A study by Kaskutas *et al.* (2016) indicates that safety talks improve communication, empower workers, reduce injuries, and improve workplace safety procedures.

Safety talks generally minimised incidents leading to disaster. Lecturers learnt how to identify hazards by looking at safety videos, attending safety courses and teamwork. A safety team talk appeared to be a platform in all industries where lecturers on WIL learnt safety procedures. Accidents seemed prevalent in the construction industry. However, safety talks for TVET lecturers on WIL appeared to promote hazard awareness, use of PPE and safe work practices. The practical assessment is discussed in the next section.

6.8 CHAPTER SUMMARY

The chapter discussed and analysed the findings of the nature of TVET lecturer learning during WIL. From the discussion above, the nature of TVET lecturer learning involved working on different machines and equipment. Their learning emerged by experiencing fabrication, machining, assembling, planned and unplanned maintenance and repair, and installing installation. Lecturers experienced learning through Kolb's concrete experience and active experimentation. Furthermore, Kolb (1984) contends that experiential learning is a transformation process continually created and recreated. Mechanical lecturers indicated learning from automated equipment, while civil engineering lecturers experienced learning from using new machines. My observation was that lecturers also experienced learning by observing and imitating the observed actions under the experienced artisans' strict supervision. The lecturer took time to look for the meaning of observations before making judgements from their perspectives (Kolb and Kolb 2009). Therefore, lecturer learning was centred around the use of machines.

The findings suggested that eight lecturers also experienced learning through comprehensive practical experiences in diagnosis, troubleshooting, and repairing engineering components during WIL. It appeared that only lecturers from electrical and mechanical industries experienced learning from fault-finding and diagnostics skills. The tasks discussed in this chapter reflected examples of concrete experience. During WIL, lecturers also benefitted through artisans' guidance, who explained job card instructions and delegated subtasks to lecturers during meetings. Lecturers also reported learning from teamwork, networking and sharing of experiences and ideas with industry personnel. In all industries, daily tasks were guided by work schedules that captured a record of events.

TVET Lecturer learning during WIL also emerged from meetings through which they analysed practical situations encountered and made conclusions that resulted in new learning experiences (Kolb 1984). Lecturers used reflection-on-practice to look back and learn from reflection on their experiences to effect improvements on processes or uphold acceptable practices in their subsequent experiences. Lecturers must reflect upon and observe their experiences from many perspectives, giving rise to new ideas or modifying existing concepts (Kolb 1984).

Generally, mentoring gave direction to industry processes, while induction served as an initiation process to introduce lecturers to industrial machines and processes. Kolb (1984) emphasises the process of adaptation to a learning environment. Lecturers from civil and mechanical engineering industries were not allowed to use equipment without doing safety training. These safety talks generally minimised disastrous incidents. Therefore, lecturers learnt how to identify hazards through videos, courses and teamwork. Through such learning methods, Kolb regards the lecturers as viewing concrete situations from several viewpoints, generating information and using imagination to solve problems (Kolb 1984). It emerged that safety team talks promoted learning through hazard awareness in all industries explored where these lecturers on WIL learnt safety practices and the use of PPE.

Overall, the nature of TVET lecturer learning through WIL was from hands-on experiences with equipment, processes and procedures. Their learning was also through meetings, reflection, induction and mentoring, teamwork and safety workshops. It appeared that these lecturers were able to apply themselves fully, openly, and without bias in learning new experiences (Kolb 1984). From the discussion, some TVET lecturers experienced all four stages of Kolb’s theory during WIL, while others did pass through all stages due to their host industries' nature of business. Specialist industries led to repetitive experiences. Their experiences were not similar across industries because some lecturers worked under strict supervision while others worked independently on tasks. Kolb (1984) claims that ELT presents a more integrative perspective on learning that combines experience, cognition, perception and behaviour.

The next chapter discusses the kinds of knowledge that TVET lecturers gained through WIL.

CHAPTER 7: DATA PRESENTATION AND ANALYSIS

7.1 INTRODUCTION

The study focuses on the nature of TVET lecturer learning during WIL. The previous chapter discussed and analysed data that addressed question one on the nature of TVET lecturer learning. Broadly, the nature of their learning is related to learning through induction and mentoring, learning through practice, learning through meetings, learning through reflection, learning through teamwork, safety workshops and assessments. This chapter presents and analyses the findings addressing question two on the kinds of knowledge that TVET lecturers gained during WIL. Broadly, the kinds of knowledge that emerged from the data included general pedagogical knowledge, curriculum knowledge, knowledge of contexts, and soft skills.

In analysing and presenting findings, I draw on literature to establish alignment with existing research. I also draw on conceptual frameworks related to kinds of knowledge as advanced by (Shulman 1987). In addition, I draw on conceptual frameworks related to soft skills (Ibrahim, Boerhannoeddin and Bakare (2017), Ellis, Kisling and Hackworth (2014) and Cline (2005) to understand the soft skills that the TVET lecturers gained during WIL.

Themes and Sub-themes

As highlighted above, the themes that emerged in answer to research question two, general pedagogical knowledge, curriculum knowledge, knowledge of contexts and soft skills, were discussed and summarised under their subthemes. These themes and their sub-themes are shown in Table 5 below.

Table 5: Themes and sub-themes

Theme	Kinds of knowledge TVET lecturers gain during WIL
General Pedagogical Knowledge	How to use different machines? How to install machines and equipment? How to test and inspect machine parts' functionality?
Curriculum Knowledge	Civil, Electrical, and Mechanical engineering skills
Soft skills	Communication, Computer skills, Listening skills, Problem-solving, Teamwork. Decorations and material recycling skills
Automation skills	Programming and Simulation
Knowledge of Context	Safety precautions, Work ethos. Conformity to prevailing norms

Source: Designed by the author from themes and sub-themes.

Notes: The table shows themes and sub-themes of the kinds of knowledge gained during WIL. Each of them is discussed in depth in the following sections.

The data from interviews and observations were combined and presented together because the responses were broadly similar. To ensure anonymity and confidentiality, lecturer participants are identified with numerical codes 1 to 18. This is also consistent with Cohen, Manion and Morrison (2017), who emphasise that participants' information should in no way reveal their identity. The sub-themes listed above are discussed below.

7.2 GENERAL PEDAGOGICAL KNOWLEDGE

Concerning the kinds of knowledge gained by TVET lecturers learning during WIL, one of the major themes that emerged was general pedagogical knowledge. Makwara (2015) explains general pedagogical knowledge as common knowledge of academic principles of teaching and learning. This section sought to show the kinds of knowledge that TVET lecturers gained during WIL and point out the nature of their learning. Literature consulted (Shulman 1987; Mishra and Koehler 2006) suggests that effective teachers must be fluent in seven kinds of knowledge and regularly update their knowledge about pedagogy to keep abreast with current educational developments. Generally, reviewed literature emphasises learning during WIL to develop the skills needed for work. Through industrial experience, TVET lecturers were exposed to civil, electrical and mechanical engineering industries, where they learnt how to perform various skills using different types of machines and hand tools. The general pedagogical knowledge is discussed under the following constructs: using different machines, installing machines and equipment, and testing machine parts functionality. **Table 6** below thematises the responses from participants who responded to the interview questions around the kinds of knowledge that TVET lecturers experienced during the WIL practicum.

Table 6: Responses on the kinds of knowledge

Sub-theme	Civil skills	Electrical skills	Mechanical skills	Using machines and tools	Testing skills	Installations	Decorations and material recycling skills	Computer skills	Communication skills	Automation Skills, Programming and Simulation	Use of CNC machines	Merging theory to practice
Lecturers	5	5	7	17	11	3	2	5	4	4	4	3
Industry personnel	4	3	4	9	4	6	0	1	1	3	2	0
Grand Total	9	8	11	26	15	9	2	6	5	7	6	1

Source: Designed by author from participants' responses.

Notes: **Table 6** below shows participant responses about the kinds of knowledge experienced by TVET lecturers learning during WIL. The discussion refers to the responses in **Table 6** throughout the discussion and analysis.

Table 6 shows the responses from all participants (lecturers and industry personnel). Twenty-six participants (17 lecturers and 9 industry personnel) exhibited learning industry skills using machines and tools. This reflects that industrial processes were performed using machines in the main. Eleven lecturers from all trades commented on testing skills, implying that civil engineering materials were tested while machines and components were tested in electrical and mechanical industries. According to Bergami and Schuller (2009), the lecturer observes, analyses, reflects, deconstructs and reconstructs the workplace processes, thereby gaining new insights that should enable progression to the next step in the model. The least mentioned skills were decorations and material recycling, which only two civil engineering lecturers highlighted. The civil engineering field allows opportunities for bricklayers, pavers, and plumbers, to create their designs, unlike in electrical and mechanical industries, where they work on machines and equipment to build and fix predetermined design structures. A discussion on learning how to use different machines follows below.

7.2.1 Using different machines

TVET lecturer learning in civil engineering industries was evident in the use of different machines and equipment to perform operations. Lecturer 1 commented on the use of machines at Company 1:

> *I used the BOMAG roller to compact the floor. The training helped me understand the operations and meaning of different sounds produced by the machine, like when it gives a sound for service. I used the dumpy level and theodolite under the strict supervision of a qualified artisan.*

BOMAG represents a brand name for compaction equipment. Lecturer 1 received training on how to use this specific machine as specified in the phrase "I used BOMAG roller". Other small intricate machines were also used under close guard of an artisan. On this notion, Mhlahlo (2020) and Atsumbe and Saba (2008) disclosed that students worked under close supervision in the workshop to develop self-confidence. Understanding operations and machine sounds reflect that lecturers could link machine sounds to different meanings, which showed understanding of machine behaviour. Ellis, Kisling and Hackworth (2014) echoed that listening skills were paramount in the industry where TVET lecturers had to give meaning to different machine sounds. According to Kolb (1984), the lecturers could be asking what happened, why it happened and what could be done better in the future to avoid the noise. These findings are in tandem with a study by Van der Bijl and Taylor (2016), who state that companies needed a long time to gain trust and proof of competence in TVET lecturers before allowing them to work independently. The trust could be that sense of responsibility developed in TVET lecturers during WIL.

Further, a conceptual framework on soft skills highlighted that listening skills were vital in learning practical skills (Cline 2005; Ellis, Kisling and Hackworth 2014). They were involved in production in a supervised way and helped rather than did things independently (Van der Bijl and Taylor 2016). The civil engineering Training Manager 1 at Company 1 commented on the use of machines by lecturers on WIL:

> *Qualified and licenced operators drive my machines. These are huge, expensive and powerful earth moving equipment that dig trenches and excavate bulk earthworks. Lecturers did not get a chance to use the machines due to training and licensure issues. The small machines used were BOMAG, vibrating plate compactor, rammer, breaker, dumper, concrete mixer, welding machine, drilling machine, dumpy level and theodolite after some in-house training.*

Another view was shared by Lecturer 13 at Company 1, who said:

We use manual and powered tools, grinder, drill, and jackhammer. I used big machines like a stamper and roller, soil compaction and pop vibrator for concrete compaction.

Training Manager 1 agreed that Lecturer 1 used small machines to carry out tasks during WIL. The use of machines was after receiving training on how to use them. However, they were not permitted to use the heavy plant machinery specifically because of the value of the machines and the operating licence required, as stated by Training Manager 1. Lecturers experienced the use of small driven tools during WIL to compact soil and concrete. Training Manager 1 confirmed the use of construction machines as highlighted by Lecturer 1 and Lecturer 13. Training Officers 1 and 3 at Company 1 responded to what lecturers learnt during WIL:

Yes, lecturers have learnt the practical side of the trade. They learnt how to use electrically powered machines like a chain and circular saw, electric hand drill, jigsaw, mitre saw, nail gun, router, sander, wood lathe and mortise. None of them showed previous experience with machine use. The lecturers did not have experience using machines, and I wonder what they were teaching in the college.

The skills listed above (using saws, hand drill, router, sander) reflect industrial knowledge learnt during WIL. Shulman (1987) explains curriculum knowledge as a body of knowledge and the teaching and learning materials from which the teacher draws to exemplify particular content. Training Officers who guided TVET lecturer learning during WIL reported that lecturers were exposed to different carpentry machines. Both participants indicated that lecturers did not have previous machine experience, suggesting that lecturers learnt to perform carpentry tasks using machines in the context of industrial operations. Literature consulted (Bukit 2012; Ismail, Nopiah and Rasul 2018) confirms that TVET teachers need to understand why a skill should be taught, whether it is still practiced in industry or already outdated. Therefore, the nature of learning for civil engineering lecturers during WIL involved different types of machines. The responses from the discussion above reflect curriculum knowledge and general pedagogical knowledge, which includes learning machines, tools, operations and skills related to teaching and knowledge of the general principles of curriculum instruction (Grossman 1990; Magnusson, Krajcik and Borko 1999).

7.3 CURRICULUM KNOWLEDGE

Curriculum knowledge entails what should be taught to students (Cogill 2008). Turner-Bisset (1999) explains curriculum knowledge as a concept that incorporates programmes developed by the government, institutions, and other stakeholders. In the context of this study, the industry personnel need to know and understand the information on the TVET lecturer logbooks detailing the practical tasks to be covered as preparation for trade tests.

7.3.1 Learning civil engineering skills

The TVET lecturer learning during WIL took place in different industries. Judging from **Table 6** above, nine participants (5 civil engineering lecturers and 4 industry personnel) indicated that new knowledge was gained during WIL. Bergami and Schuller (2009) acknowledge that TVET lecturers on industry placement accessed new or improved industrial processes and other forms of organisational knowledge. Lecturers were attached to civil engineering industries where they were exposed to different skills like carpentry, plumbing, bricklaying construction, tiling, paving, concrete work and surveying. Lecturer 1 at civil engineering Company 1 presented the following kinds of knowledge gained during WIL:

> *I learnt a lot in the industry. Laphayana, I was a bricklayer, plasterer, paver and I built a septic tank for the first time. I learnt different ways of doing things; how to cast concrete when doing a staircase, e.g. spiral and straight, lay bricks using English, Stretcher and Flemish bond, how to mix concrete 15Mpa, 20Mpa and 30Mpa. 15Mpa is used on strip foundation, 20Mpa on rough foundation and 30Mpa is used on the slab foundation. I did different foundation types: rough and normal foundations. I did steel and concrete columns and waterproofing. We touched all formworks for ama lokhunja - beams, casting concrete to guard the paving in position. Laid tar using asphalt and bitumen.*

Lecturer 1 at Civil Engineering Company 1 reported that many skills were learnt during WIL. The excerpt immediately above shows Kolb's concrete experiences. The practical exposure was characterised by learning concrete work and different types of brickwork. It appeared that Lecturer 1 was exposed to many industry placement skills by saying: "*I was a bricklayer, plasterer,* paver…". Mpa means mega Pascal, which shows that the civil engineering lecturers learnt the unit measurement of compressive strength of concrete. A higher Mpa of concrete meant a stronger material bond for heavy-duty floors and driveways. It implied that the kinds of knowledge for civil engineering construction lecturers included various construction industry skills that TVET lecturers experienced. More to that, Lecturer 1 explained: "*Foundation for the workshop must withstand vibration from machines and load* *from heavy machinery. I got to understand the concrete ratios and where they are used"*. The explanation reflects that the civil engineering lecturer understood different types of foundations and their uses during WIL. The understanding of concrete ratios was facilitated by learning soft skills. Lecturer comments suggest that they gained subject matter knowledge, which is also called content knowledge.

Grossman (1990: 6) contends: "Subject matter knowledge includes knowledge of the content of a subject area as well as knowledge of the substantive structures of the discipline". The substantive structures represented knowledge of civil engineering concepts like concrete mixtures and foundation types. Therefore, Shulman (1987) says that subject matter knowledge is the teacher's knowledge of the content that he will teach. Given the importance of TVET lecturer knowledge for student progress, lecturer WIL can be regarded as key to improving TVET education delivery. Shulman (1987: 9) further explains: "The teacher needs not only to understand that something is so but further understand why it is so". In this instance, the TVET lecturer learnt a deep understanding of the technical subject matter in the industry.

Lecturer 8 at civil engineering industry Company 1 commented on the kinds of skills gained during WIL:

> *WIL helped me to know what is happening in the civil construction industry and get information about the profession. Actual tasks were quantity surveying, calculations of materials and estimations of the cost of purchases.*

Lecturer 8 confirmed gaining industry placement skills by performing tasks that appeared to be inclined to quantity surveying and indicated to have gained knowledge on the functions of the civil engineering industry. As shown in words “calculations of materials and estimations of the cost of purchases”, quantity surveying often deals with estimating the cost of material needed for a job, valuation of the project worth and contract management. Getting knowledge and information about the profession is in tandem with Shulman's domains of teacher knowledge on knowledge of context. Seemingly, the lecturer understood the WIL environment and job expectations (Shulman 1987; Grossman 1990). Learning calculations of materials and cost estimations show that lecturers learnt soft skills during industry exposure. Newman *et al.* (2020) observed that soft skills are needed in civil engineering to manage projects successfully.

During WIL in the industry, lecturers learnt to adhere to industry safety protocols and follow instructions and work schedules outlined by company personnel. Mukeredzi and Sibanda (2016) explain the knowledge of educational context as involving an appreciation of the setting where teachers perform their responsibilities, including understanding the changes, expectations, and limitations imposed on the teacher by the monitoring and support management team. Again, Grossman (1990) adds that knowledge of context includes knowing the organisational culture, structure and practices like adopting safety protocols. Industries had different safety standards unique to their particular industries, where TVET lecturers had to learn during WIL. In response to the industry placement skills that TVET lecturers gained through WIL, civil engineering Lecturer 13 at Company 1 said:

> *I gained knowledge from digging trenches, foundation, setting out, casting foundation and concrete, compaction of foundation, backfilling, casting of the slab, building superstructure using common brick and face brick, window and door opening, glazing, reading drawings, planning construction work, quantities and estimating of materials, garage opening, beam filling, gable wall, casting cabs, laying paving bricks, runways, casting of concrete, topping, building ama sceptic tank: - concrete and brick one, site levelling, casting or placing of tar.*

Responding to the kinds of knowledge that TVET lecturers gained during WIL, Lecturer 13 stated a wide range of step-by-step skills learnt in the industry. Their learning involved skills related to construction, from digging trenches for foundation until wall completion. Superstructure generally meant a building erected from its foundation. Lecturer 13 experienced most building construction trade basic skills, which implied that the civil engineering lecturer most likely gained practical knowledge during WIL. Through their engagement in industry placement skills, the lecturer is exposed to the industrial activities of the host company where the placement is taking place (Bergami and Schuller 2009).

Therefore, the civil engineering lecturer gained the curriculum knowledge required for trade testing. This is in line with the definition in Chapter 3, where curriculum knowledge was referred to as trade testing knowledge about the modules covered in preparing for writing the trade tests. Grossman (1990) states that teachers gain their knowledge from various sources. While lecturers learnt trade skills from building construction work, they also learnt from what artisans were doing in executing their duties.

There was concurrence with Lecturer 1 on skills like casting concrete and foundation and building septic tanks and superstructures. The literature (Bergami and Schuller 2011: 134) explained: "… a vocational education teacher industry placement entails the development of industry skills, which is an integral part of industry-based WIL experience". In response to what lecturers learnt in the industry during WIL, Lecturer 14 stated:

> *As a trainee technician, I was involved in road construction, and I have learnt many skills through WIL, such as surveying using a dumpy level and theodolite. I was doing job estimates and measurement of work done before the preparation of payment certificates. We used compactors and rammers, asphalt pavers, rolling machines, concrete mixers, concrete cutters and automatic levels.*

The skills that Lecturer 14 confirmed to learning during WIL were aligned with road construction. Surveying in civil engineering often refers to examining a piece of land to provide detailed preparation and construction possibilities. Learning from job estimates during WIL dealt with approximating a project cost, considering the timelines, services and material needed for the job. Job estimate and measurement of work done can be aligned to Kolb's reflective observation, where one steps back from the task to review and measure what was done, attach a cost to it, and see how the job could have been performed better. Different civil engineering skills in road construction were learnt, which included the use of various machines.

The skills experienced by Lecturer 14 differed from what Lecturer 13 above experienced. The skills that Lecturer 13 learnt were inclined towards building construction, where the kinds of knowledge were more aligned to bricklaying duties. At the same time, Lecturer 14 was responsible for inspecting, evaluating and ensuring compliance with corporate procedures and aspects of a building as a technician. In ensuring compliance with company procedures, Bergami and Schuller (2009) posit that the lecturer encounters a period of adaptation and adjustment to the host company’s culture during WIL. Ensuring compliance with corporate procedures matches some soft skills aspects illustrated in **Figure 5**, such as conformity to prevailing norms and work ethics. My observation at Company 1 noted several sections in the civil engineering division, and lecturer placement depended on whether the lecturer had a trade diploma or a technician diploma. Upon probing, Lecturer 14 explained that a trade diploma allowed one to become a qualified builder/plasterer like Lecturer 13 above.

In contrast, a technician diploma led to performing calculations, measurements, material testing and some office-based technician duties. The kinds of knowledge gained reflect content knowledge that Grossman (1990) contends refers to knowledge of significant facts and concepts within the field. Training Manager 1 at civil engineering Company 1 confirmed the tasks performed by civil engineering lecturers and commented:

> *They learn everything from administration, contracts, construction, surveying, design and material testing, which is in their logbooks. Tasks include concrete reinforcement; erection and striping of formwork; inspecting scaffolds; setting out and building masonry structure; brickwork; trenching; concrete batching. Assemble and erect timber structures – Timber column/beams/roof trusses and steel roof truss. Work on asphalt, bitumen and stabilisation of layer works, earthworks and construction of maintenance holes and outside pipe laying.*

A comprehensive list was issued by a civil engineering Training Manager 1, who confirmed the industry placement skills that Lecturers 13 and 14 learnt. From the confirmation above, it appeared that the industry placement skills that the TVET lecturers learnt during WIL included civil engineering skills like brickwork, administration work, trenching and roadwork. I observed lecturers learning from administration work, which involved working on the computer to print site maps, drawings and contract documents. Cline (2005) reported that employers valued soft skills such as computer skills, collaboration and teamwork, creative problem solving, and interpersonal skills, impacting employee performance. To that effect, Training Manager 1 highlighted that the administration skills were in their logbooks, which meant they formed part of their curriculum knowledge to learn in preparation for writing trade tests. Plumbing Lecturer 11 at civil engineering Company 1 reported: "*On-site, I learn how to read plans, modify pipe lengths and shapes, install fixtures and use plumbing materials as needed for a building. I did the new technology on touchless taps"*. There was involvement in learning practical tasks in the plumbing trade, including the latest plumbing technology. The modification of pipe lengths and shapes aligns with Ellis, Kisling and Hackworth (2014), such as problem-solving, reasoning, creative thinking and imagination. The plumbing lecturer gained subject matter knowledge, which is referred to by Shulman (2005) as the knowledge that experts have concerning the content of a particular discipline. The knowledge focuses on the plumbing related content.

The plumbing Foreman 2 at Company 1 confirmed: *"Installation of touchless taps was new technology which the lecturer experienced for the first time as well as shower, smart pipes and water monitoring technology in this new complex"*. The plumbing lecturer seemingly gained many industry placement skills during WIL, as attested by Foreman 2 about touchless taps. Kolb's theory says that the lecturer takes a practical approach to new challenges and experiences (Kolb 1984). However, Lecturer 11 did not mention smart pipes and water monitoring technology, as stated by the plumbing foreman. Upon data triangulation, Lecturer 11 confirmed learning smart plumbing technology. The comments from Foreman 2 confirmed learning new knowledge during WIL. A civil engineering Training Officer 1 commented on lecturer tasks:

> *They learn to identify correct equipment for a job, methods of site cleaning, site marking, foundation digging, stone foundation, carpentry work for window and door frames, footing, setup lintel, wall construction, plastering in and outside walls, painting, tile-laying in bathrooms and kitchen. They used the 3-4-5 setting out method, mix concrete ratio, transfer of level, prepare and lay out ensuite concrete pavement, and erect and dismantle scaffolding. They built a cavity wall with a wooden frame, a semi-circular arc, a concrete maintenance hole, foundation brickwork, decorative masonry elements, build masonry superstructures using solid units and 1.5 brick corner in English bond. They also applied screeds to a concrete floor. They also interpreted and applied building standards relevant to ceilings and partitioning, prepare surfaces and apply tiles, waterproofing flat terraces, sloping roofs, toilets, external walls and waterproofing membranes.*

The skills such as foundation digging and setting out confirmed what was said by Lecturer 13, Lecturer 1 and Training Manager 1, suggesting that TVET lecturers gained those kinds of knowledge during WIL. Lecturer 1 also highlighted using the 3-4-5 setting out method and waterproofing, confirmed by Training Officer 1. Identification of correct equipment signified that TVET lecturers gained the experience to match skills to an appropriate machine. It pointed out that having concrete experiences was insufficient because the experiences had to be connected explicitly to more abstract civil engineering forms that the materials were intended to represent.

Civil engineering lecturers learning during WIL were exposed to a considerable number of industry placement skills like bricklaying, concrete mixing, roofing, plumbing, reading drawings, road construction and quantity surveying. Company participants confirmed that lecturers were exposed to practical skills during WIL. Furthermore, lecturers learnt some of these skills simultaneously using different machines and tools during WIL. The kinds of knowledge learnt from electrical skills are discussed next.

7.3.2 Learning electrical engineering skills

Through experiential learning, lecturers were also attached to electrical engineering industries and learnt different electrical industry placement skills. Of the eight participants who referred to electrical skills in **Table 6**, five TVET lecturers explained learning from electrical skills. The electrical engineering companies hosting TVET lecturer WIL offered industry placement skills in electrical maintenance and repair and manufacturing services. Electrical Lecturer 3 at Company 3 reported:

> *We do electric motor testing to balance the electrical current on a 3-phase system, line 1, line 2, line 3. We test shaft rotation using concentricity testing; use a solvent to clean the motor; changing the electric motor-1 and 3 phase direction. I learn to differentiate motors: direct current (DC) and alternating current (AC) motor. We use a nameplate to connect the motor either in delta or star for the AC motor.*

The vignettes from Lecturer 3 suggest that lecturer learning emanated from industry placement skills where they connected, tested and maintained electrical motors. In technical terms, concentricity testing generally refers to a process of checking the roundness of a cylindrical object against its central axis during WIL. Therefore, testing electric motor shafts, identifying and connecting electric wire lines and distinguishing electric motor types formed the industry placement skills for electrical Lecturer 3. The extent to which TVET lecturers experienced the skills suggested that the electrical company provided learning during WIL. Electrical Lecturer 2 at Company 3 responded to what was learnt during WIL:

> *I learnt calibrating, soldering, troubleshooting, fault-finding and fixing skills. I replaced capacitors, resistors and other parts with new ones using iron solder. It involved reading diagrams, opening machines and assembling back all parts in their original positions.*

An instrumentation lecturer confirmed learning a variety of skills during WIL. Surveyed literature supports that TVET lecturer WIL is the most crucial process for developing occupational competence (Billett 2010). The kinds of knowledge involved the replacement of faulty parts, which were diagnosed through troubleshooting. The lecturer correlated the instrument readings with the standard reading using instrument calibration to check the instrument accuracy. While calibrating, lecturers learnt from opening instruments, replacing parts and assembling all parts in their positions. It emerged that TVET lecturers were able to interpret drawings and use them as benchmarks to work on instruments. Training Manager 3 at Company 3 expressed the following about the kinds of knowledge that TVET lecturers gained through WIL:

> *They measure, cut, bend, assemble and install electrical conduit and make proper connections. Splicing cables and wires by stripping insulation from terminal leads and twisting wires together applying tape or terminal caps. Jobs were to connect wiring to lighting fittings and power equipment; install or replace control and distribution devices such as switches and circuit-breaker panels; connect power cables to equipment, and install grounding leads.*

The tasks mentioned above show that general pedagogical knowledge (GPK) was learnt during WIL. The lecturers reported that they learnt the electrical principles, processes and how to perform the tasks. The Training Manager at Company 3 reported practical exposure to making electrical connections to different equipment and replacing parts. Lecturers joined electric wires to carry a current, using a process known as splicing in electrical terms. Generally, grounding leads referred to earthing[18] all equipment and buildings to the ground to prevent electrical shock. Electrical Lecturer 16 at Company 3 confirmed working experience on electrical wires: "*I did troubleshooting, diagnosis and repair of electrical wires and components"*. Lecturer 2 at Company 3 above also highlighted troubleshooting and fixing, which align with the comments made by Lecturer 16. It appeared that these were common industry placement skills learnt in the industry.

Ellis, Kisling and Hackworth (2014) listed problem-solving as a necessary soft skill to get a job done. In the same light, Lecturer 17 at Company 3 responded:

> *I was responsible for setting up conduit and wiring for installed equipment and machines, including programmable controllers, while adhering to drawings, electrical ethics, using voltage tester and different hand tools. Artisans helped me perform all maintenance functions related to electrical systems and power generation distribution in line with safety operations and maintenance.*

The comments reflect the elements of GPK. Setting up conduits and wiring, as reported by Lecturer 17, implied joining cables to connect electricity to installed equipment during WIL. In line with GPK, the skills related to learning how to organise tasks and processes according to the work schedule in the industry It is also in line with organising tasks. The report tallied

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[18] Earthing is explained as a safety measure to protect property and occupants against effects of leakage currents and lightning discharges (Ferreira, 2017).

with Training Manager 3 at the same company, who said that lecturers made electrical connections to equipment. Adhering to drawings showed that lecturers gained knowledge to read and interpret drawings and diagrams. Reading and interpreting drawings show the impact of soft skills highlighted in Chapter 3. They add to enhanced work performance because lecturers could interpret drawing and apply that knowledge to install, maintain and assemble equipment. Lecturer 2 at the same company also said: "*We had to read diagrams*". TVET lecturers acquired the ability to read diagrams and interpret drawings which were vital skills and knowledge gained during industrial exposure.

Thus, TVET lecturers gained broad learning opportunities to develop curriculum knowledge, knowledge of context and general pedagogical knowledge during their attachment to the specific industries discussed. This study's findings agree with Atsumbe and Saba (2008), who noted the importance of observing safety precautions when performing tasks, recognising the value of neatness, keeping a workshop clean, and developing a positive maintenance culture when handling tools and equipment. Learning safety precautions in the industry during WIL implied that TVET lecturers learnt how to organise tasks and processes in line with industry work plans and secure to workers, equipment and the environment.

Electrical Foreman 3 at Company 3 responded about the kinds of knowledge gained by the lecturer on WIL:

> *They make sure electrical systems are safe and running with utmost efficiency; repair giant electrical equipment like industrial fans, giant motors, electrical circuits; testing electrical equipment and parts for continuity, voltage and resistance.*

Electrical lecturers reportedly repaired and tested equipment. While TVET lecturers had practical exposure, Foreman 3 suggested that electrical lecturers learnt different electrical practical knowledge during WIL. Another electrical Lecturer 16 at Company 3 responded to the kinds of knowledge gained during WIL:

> *It was troubleshooting faults, maintenance and repair of electrical wires and components. I used transducers for the construction of solar cells to convert light into electricity. At the company, I did transformers to raise and lower the voltage in the AC circuit with a corresponding change in the current. I used the moving coil meter, ammeter, voltmeter, ohmmeter, analogue and digital multimeter, potential transformers and dynamometer. I used different tools and equipment to repair, find faults and test equipment.*

Troubleshooting, maintenance and using tools show that Lecturer 16 learnt curriculum knowledge during WIL. In line with the above quote, Training Manager 3 at Company 3 shared the same kinds of knowledge that TVET lecturers learnt from using machines:

> *The industry gave them the knowledge and ability to use electrical materials, tools, equipment and testing instruments such as multimeter and volt-ohm meters. They measured current, voltage, resistance, conductance and frequency using an ammeter, wattmeter, voltmeter and power factor meter.*

Using electrical materials and tools, as referred by Training Manager 3, also reflects that lecturers in electrical engineering learnt curriculum knowledge during WIL. Training Manager 3 confirmed the use of electrical equipment and testing instruments. There was a concurrence between Lecturer 16, Lecturer 18 and Training Manager 3 on testing and diagnostic tools. Lecturer 2 and Lecturer 16 learnt troubleshooting skills during WIL. Through WIL, Lecturer 16 was involved in electrical maintenance and solar technology. Generally, a transducer converts one form of energy into another. Lecturers experienced working with transformers to boost voltage to required levels and tested electrical circuits. Lecturers in electrical engineering confirmed learning to use testing and diagnostic tools, suggesting they gained fundamental curriculum knowledge skills during WIL. The electrical machines listed by Lecturer 16 varied in size and function. It appeared that the TVET lecturers used electrical machines to test faulty equipment and newly installed and wired equipment during WIL.

The lecturers in electrical engineering attended to electrical repairs on lights and switches. The kinds of knowledge gained by TVET lecturers on WIL included repairing and maintaining equipment, wiring using drawing interpretation skills, diagnosing faults and testing electrical systems for compatibility. I observed lecturers assisting artisans in changing lights and testing electrical systems for electrical continuity. An auto electrical Lecturer 18 at mechanical Company 3 listed the kinds of knowledge gained through WIL:

> *I use testing equipment and computer software to map out electrical pathways and locate electronic malfunctions in the vehicle electrical system. I disassemble and correctly reassemble vehicle parts, worked on starters, alternators, malfunctioning lights and indicators, clearing fault symbols on the dashboard. Also, I service, maintain and repair petrol and diesel engine. I did reverse camera systems and used pneumatic spanners which made jobs fast and less demanding.*

At Company 3, Training Manager 3 responded to the kinds of knowledge that TVET lecturers gained during WIL:

> *Lecturers performed electrical repairs and routine maintenance on production equipment and switches; replaced lights fixtures, wired machines, and electrical panels in line with printed drawings. They identified a problem and proffered logical solutions; used a collection of diagnostic devices and tools to service and install electrical equipment; repaired faulty equipment and systems. They tested the continuity of circuits using a multimeter, volt-ohm meter and amp-probe.*

The vehicle workshop offered several auto electrical skills referred to in the above excerpt (replacing lights fixtures, diagnostics, routine maintenance and repairs) to a lecturer on experiential learning. By mapping out pathways, lecturer learning during WIL referred to troubleshooting malfunctioning vehicles' electrical systems using diagnostic tools, fault code readers and scanners. Training Manager 3 confirmed that Lecturer 18 learnt auto electrical fault-finding knowledge during WIL, which were the initial vehicle maintenance and repair steps. The skills reflected curriculum knowledge which Shulman described as “tools of the trade” for teachers.

The findings presented above were in line with the curriculum knowledge reported by Donkor, Nsoh and Mitchual (2009) that participants acquired new manipulative practical skills, new technologies, machine and interpersonal skills during the industrial attachment. They also had a unique opportunity to use specialised equipment and machinery not available in their school workshops (Donkor, Nsoh and Mitchual 2009; Ismail, Nopiah and Rasul 2018). In the same vein, TVET lecturers were exposed to new equipment and machinery during WIL.

The findings from lecturers in electrical engineering indicated that TVET lecturers gained knowledge to connect, test and maintain electrical motors, work on transformers, assemble components, troubleshoot faults, electrical wiring and interpret drawings. Lecturers used electrical equipment and machinery to test, measure and troubleshoot electrical systems and equipment. They also learnt from new equipment and from a transformer’s function to increase or reduce alternating current. Besides the practical industry experience, TVET lecturers also learnt soft skills, which helped them adapt to the industry environment and situations.

7.3.3 Learning mechanical engineering skills

Lecturers experienced curriculum knowledge and GPK in different mechanical industries. Table 6 above shows eleven participants referring to mechanical skills, of which seven were mechanical lecturers. WIL lecturers were attached to industries that specialised in manufacturing and production, maintenance and repair. My encounter with Lecturer 4 in the mechanical engineering field from the boilermaking background explained the following:

> *I only knew a few machines: guillotine, press roll, bending press and inverter. In industry, we worked with big machines, where I gained more knowledge of machines and procedures of their usage. I worked with pressure vessels and learnt precautions when working in confined spaces. According to the drawings, we fabricated different shapes, rolled big pipes developed to cone shapes, drill holes, and align on flanges. I learnt argon, CO_2 and arc welding and used a nibbling machine to cut shapes on metal following the correct procedures. I also used the CNC machine to form, shape and cut metal.*

The acronym for computer numerical control is generally known as CNC. Lecturer 4 confessed to learning during WIL and using various boilermaking machines as a first experience. The experience was gained from using machines and carrying out procedures as signified in the above excerpt that lecturers used a nibbling machine in the boilershop to cut, fold, bend, slot, and punch sheet metal. Through these operations and processes learnt in the boilershop, the lecturers were exposed to curriculum knowledge and GPK.

Furthermore, Lecturer 4 mentioned working on pressure vessels like tanks, boilers and steam pipes. A guillotine is a machine used to cut sheet metal. The lecturer used drawings to fabricate different shapes, which implied that machine skills and interpretation of drawings were learnt during WIL. Generally, lecturers on WIL worked in confined spaces to manufacture containers designed to hold liquids or gases under pressure. The tanks had a limited entry and exit from where lecturers learnt to observe necessary safety precautions about confined spaces. Consequently, Ibrahim, Boerhannoeddin and Bakare (2017) listed soft skills like taking risks and prioritising essential tasks in their order of preference which seem to align with the experiences of Lecturer 4.

A welding Lecturer 7 at Company 2 confirmed learning from different welding styles and said:

> *I used all types of welding machines and other equipment like plate shear, rolling mill, laser, guillotine, grinding, press, furnace and punching machines.*

I learnt to do repairs and welding processes like MIG, TIG, CO_2, stick and argon.

Another point of view about the kinds of knowledge that Lecturer 4 gained during WIL established the following:

I learnt to fabricate from drawings to real projects. I learnt how to operate different boilermaking machines, welding types - arc welding, CO2, and gouging. Gouging is making a groove or indentation on metal to see crack depth and length using a gouging rod and argon gas.

Both Lecturers 4 and 7 learnt curriculum knowledge and GPK by fabricating and operating different boilermaking machines. The responses showed a concurrence on different welding machines and processes experienced by TVET lecturers during WIL. MIG represented metal inert gas, while TIG meant tungsten inert gas, and CO_2 referred to carbon dioxide gas. The lecturer learnt to use these welding gases, which acted as a shield on the weld pool against the atmospheric gases. To explain the welding processes highlighted by Lecturer 4, **Figure 13** below shows a diagrammatic representation of the process.

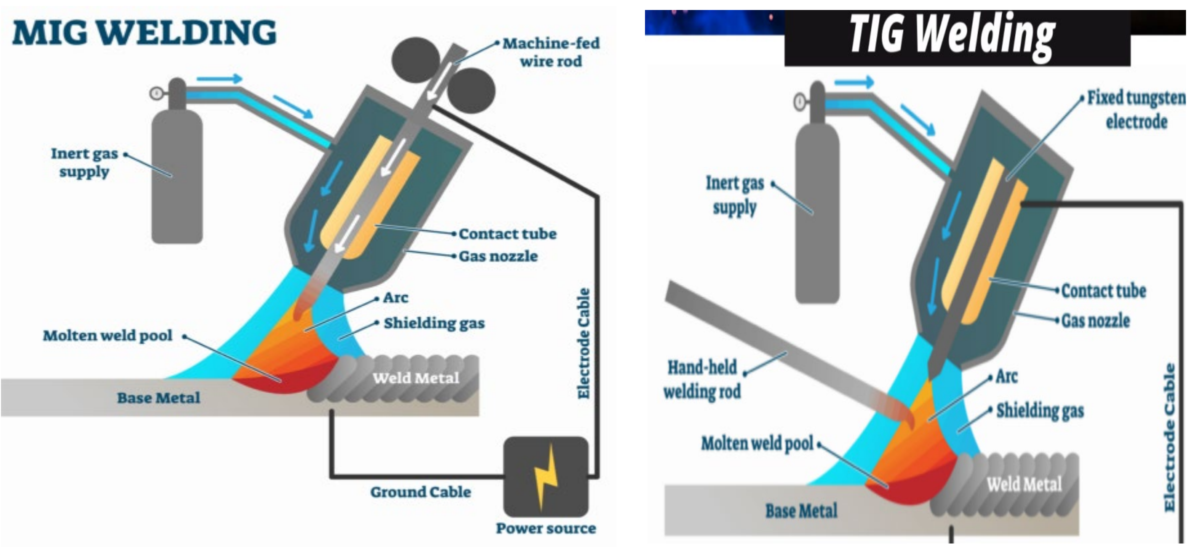

Figure 13: Welding processes

Source: https://weldingzilla.com/wp-content/uploads/2020/12/Best-welding-Helmet-7-1024x576.png

Notes: **Figure 13** demonstrates the welding processes as explained by welding participants. Participants noted the processes as crucial during WIL in boilermaking.

Figure 13 explains the welding process showing the different energy sources and feed methods. The shielding gas protecting the weld area, as referred by Lecturer 4, is shown in blue. Lecturer 7 was exposed to four core welding processes, seemingly gaining curriculum knowledge in different welding skills. At the same time, the lecturer gained GPK by learning welding processes and how to use the machines. The responses further suggested that Lecturer 4 learnt to fabricate components from drawings which implied that lecturers learnt to interpret drawings during WIL. Both Lecturer 4 and Lecturer 7 confirmed that they used drawings and machines to make components. Lecturers 5 at Company 2 shared experiences on the kinds of knowledge gained during WIL: "*I learnt how to strip, align, assemble and do fault-finding on pumps. Used dial test indicator for shaft alignment when machining on the four-jaw chuck*" (*Lecturer 5).* Lecturer 6 added:

> *As a turner, I use a centre lathe machine to cut different threads, a milling machine and a pedestal grinder to shape and metal and sharpen tools, respectively. I learnt how to cut gears on a gear hobber, cut different materials like stainless steel, mild steel, brass and bronze on a band saw.*

Lecturer 6, like Lecturers 4 and 7 above, also learnt curriculum knowledge and GPK by using a centre lathe machine and other tools and equipment and working with different materials. GPK was gained when the lecturer operated different machines. During WIL, TVET lecturers gained knowledge and skills from fault-finding, alignment, using different materials, assembling and using machines like lathe, milling and grinder. The use of fitting and turning machines formed the essential skills for a mechanical lecturer's industry experience. The finding of using different materials aligns with the work of (Jawarneh and Al Azam 2017) and Atsumbe and Saba (2008), which found that the work skills needs of vocational teachers and Engineering and Technology students included the appreciation of the value of materials and consumables and using them prudently. The assertion immediately above aligns with soft skills such as conforming to prevailing norms and having a positive attitude. I would assume that appreciation comes from an individual with an optimistic attitude towards work. The lecturer gained knowledge of different part names and how the parts were aligned in position through stripping parts. The lecturer's experiences from the excerpt immediately above align with the conceptual framework that teachers must experience the learning environment (context) themselves to gain sufficient information to put ideas into practice (Grossman 1990; Magnusson, Krajcik and Borko 1999). Lecturer 6 at Company 2 confirmed what was said by Lecturer 5 above: "*I changed bearings, did much alignment on drives, so there were many hands-on operations that we were doing*". Alignment re-emerged because fitting parts in place required arranging them in correct positions relative to other parts. Therefore, Lecturer 5 learnt GPK by operating and repairing items.

Refrigeration Lecturer 10 at Company 2 responded to the kinds of skills gained during WIL:

> *I work with different gases. The refrigeration cycle steps are compression, condensation, expansion and evaporation. I worked on cold rooms, domestic and industrial fridges and learnt to prevent oxidation by running nitrogen in the pipe system when pipe welding. Nitrogen keeps a long life in the system. I used leak detectors like the bubble soap method, electronic, and halide light. Used a recovery unit to remove gas from the fridge into a gas tank.*

Lecturer 10 learnt GPK by experiencing the principle of the refrigeration cycle. *For example, "I used leak detectors like the bubble soap method, electronic, and halide light".* The lecturer also learnt curriculum knowledge through the different terminology like the recovery unit and different steps in the cycle. The refrigeration lecturer reported gaining experience in types of gases, refrigerators and leak detectors. Therefore, the kinds of knowledge that TVET lecturers learnt during WIL involved learning through the four-step refrigeration cycle, where the value of each step was appreciated. The lecturer used a recovery unit as a safety measure to prevent the gas from escaping into the atmosphere. Grossman (1990) says that GPK consists of a frame of wide-ranging information, opinions, and skills related to teaching and knowledge and beliefs regarding learning and learners. There was learning from taking precautions in preventing the gas from damaging the ozone layer. From the safety precautions, the TVET lecturers learnt GPK on how to organise tasks according to the tasks assigned from the industry's work schedule. Further, adherence to safety precautions aligns with soft skills like self-discipline, adaptability to the work environment, and work ethics. Generally, Lecturer 10 gained knowledge of servicing and repair of different types of refrigerators. At Company 2, Training Manager 2 responded to the kinds of knowledge that lecturers gained through WIL:

> *They use precision instruments to measure, examine and test completed units to detect defects and ensure conformance to specifications. Boilershop specialised in welding processes and types, and fitters were stripping, fitting and fault-finding. Machinists aligned and secured holding fixtures and machined parts as per drawings.*

The practical skills indicated by Training Manager 2 showed GPK where lecturers learnt to organise tasks and use machinery. Training Manager 2 summarised the skills gained by lecturers attached to the mechanical industry and highlighted that lecturers gained all skills by indicating that they learnt everything. It implied that the nature of TVET lecturers learning during WIL involved gaining industry related mechanical skills in their respective trades. Training Manager 2 indicated that lecturers lacked knowledge which concurred with civil engineering Lecturer 1, who indicated earlier comments. Therefore, civil, electrical and mechanical lecturers benefited from learning in industry during WIL. Lecturers gained practical knowledge, which helped them to improve their curriculum knowledge. The responses indicated that industrial exposure provided them with opportunities for working with most current technology, machinery, equipment, tools and systems, contributing to product knowledge vital for making concepts accessible during delivery. It is noted that the findings resonate closely with the finding in the literature by Muchemi *et al.* (2013) that participants gained the power to relate teaching and learning processes to the latest development in industries. In this study, the TVET lecturers learning during WIL gained these skills.

Lecturers on WIL were reported gaining machine operation skills and processes during WIL. During their learning experience in the industry, they learnt the content of a subject and knowledge of their discipline (Grossman 1990). Through WIL, a lecturer's understanding of subject matter is transformed to make it teachable. Both TVET lecturers and industry personnel confirmed using machines and tools to carry out civil, electrical and mechanical engineering processes. Some machines were used under strict supervision, while the others were not used due to operating licence requirements. During WIL, the lecturers gained bricklaying, plumbing, welding, boilermaking, refrigeration, electrical, and fitting and machining skills. Some company personnel confirmed that there was evidence of gaining new knowledge since lecturers did not know much. The following section presents inspection, testing and installations.

TVET lecturer learning during industry exposure involved gaining GPK from inspection, testing and installations. I focused on the two sub-themes: learning inspection and testing skills and learning installations to unpack the discussion.

7.3.4 Learning inspection and testing skills

The nature of TVET lecturer learning during WIL included learning new practical skills. **Table 6** (see pp. 172) shows that eleven lecturers experienced inspection and testing skills during experiential learning, where they checked for compliance with specifications. Civil engineering Lecturer 1 at Company 1 said: "*Some of the new skills we experienced were testing concrete using slump test; testing compacted soil using Proctor compaction test and testing strength in screed using BRE screed test".* The civil engineering lecturer used a BRE screed test to measure the soundness of sand and cement floor screed, thereby experiencing the use of civil engineering testing equipment. Therefore, the civil engineering lecturer learnt GPK on how to perform material testing using different methods. A concrete slump test[19] was also done to measure concrete consistency, check the workability of freshly made concrete and indicate the concrete mixture quality. Training Manager 1 at Company 1 shared new skills which lecturers learnt through WIL:

> *They tested the workability of concrete using slump test, compressive strength in concrete using cube test. Also tested compacted soil using standard and modified Proctor compaction test. Lecturers tested the strength in screed or topping using BRE screed test and material testing using machine survey equipment and accessories (Troxler). Soil density, concrete, water absorption rate testing in bricks and concrete.*

Training Manager 1 immediately above outlined material testing skills. The BRE screed test, concrete slump test and Proctor compaction test matched the skills mentioned by Lecturer 1. Lecturers learning during WIL reportedly experienced these new skills. From the literature (Adjei, Nyarko and Nunfam 2014), experiential learning occurs from direct participation in industry practical experience. The testing of materials prepared lecturers to ensure that their work output was of recommended standard. Training Manager 2 at Company 2 also confirmed: "*There was the testing of experimental models under simulated operating conditions for purposes of development and standardisation of design".* It appeared that some lecturers were involved in experimental material testing to establish its suitability for use. Therefore, lecturers gained GPK where they learnt broad skills methods of testing materials. Electrical Lecturer 3 at Company 3 reported: "*I learn how to test the electric motor using a multimeter to find line 1, line 2, and line 3".* Refrigeration Lecturer 10 at Company 2 noted: "I t*est and adjust commercial evaporative condensers".* Lecturers from civil, electrical and mechanical trades used the testing equipment. Literature consulted (Adjei, Nyarko and Nunfam 2014) confirms that industrial attachment provided an opportunity for polytechnic lecturers to sharpen their practical skills.

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[19] The slump test is used to ensure uniformity for different loads of concrete under field condition (Bhogayata and Arora, 2017).

The participants immediately above showed that testing of equipment and systems was common among lecturers learning during WIL. Different industry personnel like the Training Manager 3 at Company 3 narrated: "*They were testing the continuity of circuits to ensure conformance to electrical standards and safety of components with testing instruments*". The company personnel responsible for their learning disclosed testing of circuits using instruments, therefore confirming that the lecturer gained some testing skills during WIL.

Training Manager 1 at Company 1 commented on how lecturers experienced learning from inspection, saying: *"The lecturer did inspections, planning and estimation using specifications and drawings on-site. In addition, the lecturer assisted in drawing and compiling an inspection checklist"*. Training Manager 3 confirmed the same findings: *"They learn to do inspections on equipment"*. Inspection was an essential step in engineering trades as it ensured that the parts were in good working order. Civil engineering lecturers reportedly used specifications as their reference documents during WIL to check the quality of buildings under construction.

In response to the new skills learnt by mechanical lecturers during WIL, Training Manager 2 at Company 2 noted: *"Lecturers check workpieces to ensure proper lubrication and cooling. They measure, examine and test completed units to check for defects and ensure conformance to specifications"*. Lecturers learnt from inspection of components in the mechanical industry to check the components for adherence to specifications. Lecturers examined and tested units against specifications to ensure their suitability for purpose.

It appeared that lecturers on experiential learning during WIL experienced using various testing tools and methods that formed part of the nature of their learning during WIL. Lecturers seemingly learnt different testing methods, as confirmed by four industry personnel in **Table 6** (see pp. 172) above. During WIL, lecturers reportedly used specifications as reference checklists on the quality of buildings under construction. Lecturers from civil, electrical and mechanical trades reported learning from using testing equipment. Lecturers learnt to inspect components in the mechanical industry, where components were checked for adherence to specifications. In this case, TVET lecturers learnt processes or methods of using specific machinery in industry processes to achieve, for example, required material testing and correct assembly of parts. Therefore, during WIL in this study, the TVET lecturer learnt how to engage in industry processes, machines, procedures, and industry tools. TVET lecturers also learnt from different types of installations.

7.3.5 Installations

The nature of TVET lecturer learning during WIL involved placing machinery and equipment in position and connecting it for use. In this way, TVET lecturers gained GPK, which involved broad skills and methods to set up machines and equipment. Three lecturers reportedly installed equipment during WIL, while six industry personnel attested to it. A plumbing Lecturer 11 at Company 1 recounted installation processes experienced through WIL:

> *I installed many geysers, sinks, porcelain bathtubs, washing basins, drain systems. Further to that, I connected plumbing systems like water supply system, sewer system and shower.*

A plumbing Foreman 2 at Company 1 disclosed the kinds of skills that the plumbing lecturer engaged in:

> *The lecturer installs and fixes domestic appliances, such as dishwashers, pipes and fixtures such as sinks and toilets, heating and air-conditioning systems, including gas water heaters. The work is done in compliance with local municipality regulations. The plumbing team installed fixtures associated with heating, cooling, water distribution and sanitation systems in residential and commercial structures.*

The plumbing fixtures' installation was stressed by a plumbing lecturer who installed different plumbing fittings. The installation varied from connecting different plumbing pipe systems to connecting fixtures. It appeared that Lecturer 11 gained GPK to install and fix different systems and equipment during WIL. Foreman 2 confirms: "*The plumbing team installed fixtures associated with heating, cooling, water distribution and sanitation systems*".

The foreman narrated the installation of plumbing equipment and expressed interest in the skills that Lecturer 11 experienced. My observation at the plumbing site highlighted that Lecturer 11 worked on a newly finished building, installing new fittings. The lecturer gained some GPK on how to perform plumbing tasks on fitting new fixtures through that experience.

During the installation process, Lecturer 16 at Company 3 commented: *"I did all procedures for installing and maintaining electrical systems"*. Training Manager 3 at Company 3 also reported: *"They also do the installation of electrical equipment"*. Training Managers 2 at Company 2 reported on installations: *"They install new or replace equipment parts such as hydraulic systems, electrical wiring and mechanisms"*. Installation involved connecting electrical wires to machines and ensuring their readiness to operate. In the mechanical trade, the GPK gained through installations generally involved unpacking, assembling, aligning and setting up the machine to its working order.

The installation of equipment in civil, electrical and mechanical engineering industries was supported by Training Managers, whose responsibility ensured that lecturers learning during WIL gained knowledge from performing various tasks. Installation ranged from industry to industry but included fitting equipment, machinery and fixtures in position and connecting them to function effectively. The following section discusses soft skills gained by TVET lecturers during WIL.

7.4 SOFT SKILLS

Soft skills are intangible and non-technical skills that lecturers experienced through WIL. Cline (2005) describes soft skills as non-technical abilities and abstract personality skills determining one's strength as a leader, mediator, negotiator, and listener. Ibrahim, Boerhannoeddin and Bakare (2017) list several common examples of soft skills: being a team player, ability to communicate effectively, displaying confidence, sharpening creative skills, accepting and learning from criticism, self-motivation, leading others, taking risks, multitasking, and the ability to prioritise essential tasks in their order of preference. The skills were essential in gaining more knowledge in their areas of expertise. Mesuwini, Singh-Pillay and Bomani (2020) emphasise the impartation of technical and soft skills required by industry. Essentially, soft skills complement technical skills, which are the technical requirements of a job (Ellis, Kisling and Hackworth 2014). To be competitive in the current industry, the workforce needs to have soft skills and technical skills to execute tasks in line with technology trends. The examples of soft skills that emerged included computer skills, communication and learning from decorations. Payne (2018) and Ellis, Kisling and Hackworth (2014) identified soft skills as vital facets in executing workplace processes. These skills are discussed next.

7.4.1 Computer skills

Computer skills have become inseparable from the fourth industrial revolution (4IR) in making engineering processes simpler, faster and more efficient. In support, Mesuwini (2015) emphasised the need for problem-solving, communication skills, analytical, creativity, and computer skills in all engineering fields. Drawing from **Table 6** given above, five lecturers learnt computer skills. Lecturer 14 at Company 1 described the computer skills learnt during WIL:

> *Yes, I have learnt many skills through WIL, such as MS Project, to plan work to be completed within a specific period. I am drawing using AutoCAD, civil design software and using Prokon structural analysis.*

Computer skills were listed as vital skills necessary for their experiential learning during WIL. Lecturer 14 confirmed: "*I am drawing using AutoCAD"*. Lecturer 14 also used MS Project to run projects, manage resources and monitor work progress. CAD is an acronym interpreted as Computer-Aided Design/Draughting. The software programme is used in engineering to make design drawings. Therefore, lecturer learning during WIL involved various computer skills, including Prokon, structural analysis and design software. Civil engineers and engineering technicians use the software to help streamline their design models. Cline (2005) reported on soft skills saying that employers valued computer skills to succeed in their operations. Therefore, working on AutoCAD and MS Project needed computer skills knowledge.

At Company 2, Lecturer 7 said: "*We used daily schedules, Computerised Maintenance Management Systems and MS Project to guide the daily tasks"*. Lecturer 14 above also mentioned MS Project, which confirmed that the software was used at the mechanical and civil engineering companies. Training Manager 2 at Company 2 noted: "*Lecturers programme computers and electronic instruments such as CNC tools. They also used a maintenance management system to track jobs and allocate resources"*. The use of computers to access different software programmes was witnessed by the Training Manager at Company 2 and Training Manager 3 at Company 3, who narrated: *"They learn about PLC software, how a PLC is integrated with electrical equipment and mechanical equipment to make the plant functional"*. PLC is a standard industry acronym for Programmable Logic Controller used to monitor industry-manufacturing processes. While lecturers were exposed to industrial processes, they also had a chance to learn by using digital monitoring systems such as PLC to monitor manufacturing processes in industry. It implied that there was learning from using the software during WIL. Lecturer 18 at Company 3 responded:

> *The use of computer technology was a mystery. Using computer diagnostic technology to diagnose the problem, I took less time to do a task because technology enhanced troubleshooting.*

The word mystery essentially captures some disbelief that arose from simplifying tasks with new technology during WIL. The effects of using computer technology were reported as a quicker method of learning during WIL, where technology was used towards seeking solutions to tasks. Ellis, Kisling and Hackworth (2014) state that soft skills complement technical skills, which are the technical requirements of a job. The findings confirmed that lecturers from mechanical, electrical and civil engineering industries used relevant software in their respective areas of specialisation.
Communication is another soft skill that stood out in the study.

7.4.2 Communication

TVET lecturer learning during WIL involved different communication types used in industry, including written, oral, and non-verbal communication. Four lecturers confirmed learning through communication, even though the other lecturers may have experienced learning through that process. The reason for communication determined the correspondence method to use. Communication is necessary for the success of any workplace operation. Notably, lecturers learning during WIL reported receiving effective instructions from their mentors in the industry. Similarly, Dondofema, Mwenje and Musemwa (2020) confirm that engineering students learnt how to listen and carry out instructions. In this view, Lecturer 2 at Company 3 narrated: "*It is a lot. I learnt communication skills, creativity, problem-solving and attention to detail. You must know how to communicate; otherwise, you will not get what you want*". The literature surveyed (Bukit 2012) notes that TVET teachers also learnt from colleagues, built relationships with colleagues, and acquired supervisory and managerial skills through practice and observation. TVET lecturer learning in the industry was hinged on communication and listening skills to get the industry skills they needed.

The findings highlighted that there were many soft skills that lecturers on experiential learning gained during WIL. Creativity and problem-solving were soft skills that lecturers experienced during WIL. They had to be resourceful and brainstorm possible solutions to tasks. During experiential learning, Lecturer 2 stressed the value of communication when working. These findings align with a similar study conducted by Govender and Wait (2017), who state that WIL experiences derive several benefits: communicative abilities and interpersonal relations. Lecturer 8 at Company 1 reported learning through communication, saying: "*We kept daily diaries and registers on site and communicated with stakeholders and made sure the plant and equipment were of good standard"*. Diaries and registers contained daily activities that were recorded and communicated during WIL.

A civil engineering Lecturer 13 at Company 1 disclosed: "*We learn how to communicate with other trades such as electricians and plumbers"*. It appeared that civil engineering lecturers' work involved working with other trades since a building needed, for example, electricity and plumbing fittings to be complete. I observed at one construction site pavers, plumbers, carpenters, electricians and bricklayers working on the same structure. For instance, a plumber was busy installing a geyser while an electrician was working on electrical connections. Hence, lecturers had an opportunity to communicate with other tradespeople in their line of duty. In this view, Ellis, Kisling and Hackworth (2014) contend that listening and communication skills are necessary soft skills for successful company operations. Further, there is a consensus in the literature suggesting that WIL participants benefited from soft skills and critical thinking skills during industry exposure (Renganathan, Karim and Li 2012; Pernsteiner 2015; Govender and Wait 2017). The same view was shared by Lecturer 11 at Company 1: "*On-site, I learn how to read plans and to engage with other artisans in other trades, e.g., electricians, carpenters, welders …"*. The response showed that communication was important since lecturers on WIL needed to liaise with others so that their coordinated efforts yielded results. In this view, Mesuwini, Singh-Pillay and Bomani (2020) note that all three engineering fields require soft skills like communication, problem-solving, critical thinking.

In support of communication during WIL, a plumbing Foreman 2 at Company 1 reported: *"This plumber collaborates with contractors, construction workers, electricians, pipefitters in installing and repairing plumbing equipment"*. The excerpt emphasised the collaboration of tradespersons to ensure smooth running of activities on site. Since an installed geyser needs electricity to function, an electrician is needed to connect it. The finding is also in line with the literature from Martin and Rees (2018), Govender and Wait (2017), Chua and Jamil (2012) and Bergami and Schuller (2009). They emphasise that WIL placement built networks, interpersonal relations and contacts. Murgor (2017) and Ellis, Kisling and Hackworth (2014) confirm in the conceptual framework on soft skills that collaboration was achieved using interpersonal skills, teamwork and communication skills to liaise with colleagues at a working site.

The above discussion showed the effects of communication in industry. Lecturer 2; Lecturer 8; Lecturer 11; Lecturer 13 and Foreman 2 confirmed that communication was critical to all operations regardless of industry type. Therefore, lecturers learning during WIL gained communication skills. Through communication, participants gained innovative ideas to establish links with industrial and socio-partners (Muchemi *et al.* 2013). The following section presents learning from decorations and material recycling skills.

7.4.3 Decorations and material recycling skills

The kinds of knowledge that TVET lecturers gained during WIL involved some unique skills. Two civil engineering lecturers reported learning decorations and material recycling skills. While most skills were prescribed in the textbook, lecturers learnt those skills in industry, making WIL crucial to their learning. Lecturer 1 at Company 1 replied on the new skills gained during WIL:

> *I learnt laphayana material saving. Material is reused through decoration using broken tiles. Safunda (we learnt) making walkways using slabs and paving bricks. It is a type of decoration. I did decorations on houses, how to mix colours to make a decoration. There are new ways of saving money where raw materials are used to make parts as per design. The broken bricks are not thrown away as rubble but cut into half bricks and used as a line of half bricks.*

Lecturers gained cost-saving measures by using broken tiles and bricks and mixing materials to achieve specific decorations and designs. The use of broken material was reinforced where lecturers on WIL were taught to maximise the use of damaged material through design decorations on structures. Lecturers also learnt to improvise, a skill which could not be found in the textbooks. The findings align with Dondofema, Mwenje and Musemwa (2020) study, which reported that industry placement developed creativity and work initiative to make suggestions for job improvements. A civil engineering Training Officer 1 at Company 1 confirmed: "*They build decorative masonry elements*". From my observation, civil engineering lecturers used different paving-coloured bricks to design colourful paving and walls. A conceptual framework on soft skills indicated flexibility, and creative problem-solving skills, which equip individuals with the ability to think and act beyond the confines of their course structures. It implied that TVET lecturers learnt to perform thought-provoking tasks outside the scope of their syllabi but relevant in their learning during WIL.

The above findings are in line with surveyed literature conducted by Cheong *et al.* (2014), who acknowledge that learning takes place beyond the confines of the classroom, where an opportunity is availed for first-hand experience in the daily operations of an organisation. Further, it was indicated that WIL is very vast as it incorporates many areas which are not covered by the textbooks (Cheong *et al.* 2014). The following section discusses learning through automation.

7.5 AUTOMATION SKILLS

Automation[20] forms a more significant part of today's industrial processes as the world works towards the 4IR. The entire automation operation depended on the human hand to monitor and control the technical systems where lecturers on WIL were involved. Some lecturers were exposed to programming and simulation, as explained below.

7.5.1 Programming and simulation

The nature of TVET lecturer learning during WIL involved computerised machinery in developing programmes tested through simulation. Due to the nature of the process, four lecturers confirmed learning from programming and simulation skills. A simulation is an imitation of a planned machine operation used to visualise real production sequences. Mechanical Lecturer 15 at Company 2 responded to learning through programming: "*We learnt to use programmable machinery to programme and do a test run to see if the programme was correct. I used lathe and milling machines only"*. It was clarified that a mechanical lecturer was exposed to automation skills by programming machines and running simulation operations before starting full production. Also, the lecturer emphasised using lathe and milling machines only, which implied that there was skills specialisation at the company. However, from my observation, there was no conformity with what mechanical

[20] Automation involves the use of different modern manufacturing and control systems to operate machinery and equipment with minimum human intervention (Mikolajek, Otevrel, Koziorek & Slanina, 2015).

lecturers said, as I observed them watching the CNC operator using the machine. Lecturers could have been learning through observation at the time that they were observed.

Auto electrical Lecturer 18 at Company 3 supported programming and said: *"I was using computer technology to find and clear faults. I used symbols and codes representing the vehicle faults on the Auto Diagnostic Scanner".* The lecturer learning during WIL used a diagnostic scanner to check the whole vehicle system. Usually, it is used to reset the computer box memory to default settings and clear the faults. It appeared that the nature of lecturer learning involved the use of computer technology to programme and restore operating software for vehicles and machines. Training Manager 2 at Company 2 concluded the responses about programming and simulation by saying: *"They programme numerically controlled machine tools, setting controls to regulate machining and entering commands to retrieve, input or edit CNC programme".* Some participants reported using computers to programme and test the smooth running of the programmes through simulation. Programming was also done using CNC machines during WIL. Mechanical and electrical trades were exposed to programming and simulation. The traits align with Cline's description that soft skills are intangible yet impact employee performance.
A discussion on the use of CNC machines follows below.

7.5.2 The use of Computer Numerical Control of machines

The use of CNC was highlighted by six participants who appreciated the shift from conventional to computerised machinery. Four of the participants were lecturers from the mechanical trade who learnt soft skills using CNC machines. Lecturer 6 at Company 2 commented on CNC machines: "*I was helping the artisan on the CNC machine to mount different blocks of brass for machining to precision".* By assisting the artisan to mount a machining workpiece, Lecturer 6 was exposed to the CNC machine. Responding to the use of machines, Lecturer 9 at Company 2 narrated: "*A specialist taught me to use CNC machines. I used to assist in setting a programme and testing it".* The findings confirm what was raised by Lecturer 6 about using CNC machines under qualified artisan guidance. The CNC machine was explained as high-quality production machinery where the machined parts were probably required to maintain specified engineering tolerances. The findings align with the conceptual framework on soft skills outlined by Payne (2018) that computer skills were a helping hand in creative problem solving and interpersonal skills, which employers valued. By observing the CNC lathe machine at Company 2, I found that the artisan was too fast in explaining how to retrieve a stored program to both Lecturer 6 and Lecturer 9. It appeared that the artisan assumed that lecturers had background knowledge of the CNC software. Further, there seemed to be no set time to explain the whole process as the artisan had some production targets to meet.

Literature consulted (Sewell, Venter and Mason 2015) confirms that some South African Small, Medium, and Micro Enterprises (SMME) managers (67%) vented their unwillingness to host students for WIL, citing challenges of adequate time to coach or mentor them effectively. Hence, some explanations were done in passing. Lecturer 15 at Company 2 expressed these experiences about the use of CNC machines:

> *I learnt that there are many CNC machine types as lathe, milling and cutting machines such as laser cutters, plasma, thermal, shearing machines, band saws and flame cutters. I learnt to read the data, convert data into coordinates for the machine tool, develop motion instructions for CNC, and set codes for various instructions.*

My observation was in contrast to what the engineering Foreman 1 at Company 2 said:

> *Yes! The mechanical leant the use of advanced CNC here as most of our plant is automated. They were exposed to preparing and writing a simple programme, setting machines to perform a specific task and operating the CNC machine.*

The findings from Lecturer 15 and Foreman 1 at Company 2 showed that CNC machines were used in industry during WIL to carry out various operations. Converting data to coordinates refers to drawing information inputted in the machine using the designated codes. As I reflected earlier, lecturers on WIL who worked on CNC assisted rather than controlled the machines themselves. Through observation, I found out that artisans were taking a leading role in setting up programmes and general performance of the CNC tasks. However, a study conducted by Tse (2010) investigated the kinds of knowledge gained through WIL. The results showed that the placements helped develop practical skills through using software and experiencing work procedures.

Findings confirmed that the nature of lecturer learning through WIL exposed them to using CNC machines. Still, on a larger scale, they assisted artisans in mounting work and setting up machining programmes. That as it may, lecturers experienced setting instructions through codes on different CNC machines during WIL. The use of CNC machines was common in the mechanical trade.

Therefore, lecturers seemingly gained soft skills, which helped them to improve their practical knowledge. Knowledge of context was explained as a prerequisite for entry into the industry, giving lecturers an understanding of the machines and work ethics. The chapter discussion is concluded below. The context under which TVET lecturers experienced learning is discussed next.

7.6 KNOWLEDGE OF CONTEXT

The knowledge of context is discussed under the industry environment where TVET lecturers gained their exposure.

7.6.1 Industry environment

The nature of learning for TVET lecturers during WIL was dependent on the industry environment. Eleven lecturers mentioned different work environments which they experienced during WIL. These included manufacturing, maintenance, construction, indoor, field, among others. Literature indicates that WIL placement in industry is possible if the employers are willing to host TVET lecturers for industry exposure Swiss-South African Cooperation Initiative (2012). Lecturers were attached to civil, electrical and mechanical industries. Hence, the nature of their learning may have been different. The comments below indicate lecturers' views:

> *There is so much hazard in the company, e.g. materials and machines. It is noisy, but not that I hate noise. Each year we were taken for medicals to check our health. Honestly, the working environment is not right. On the first day, you must go for a medical test to check your fitness before starting work. You work from outside such that when it is raining, you get wet. It is windy and dusty, and there are overhead machines. Aaah, it is dangerous, so you need to be wise and always think about safety around the workplace (Lecturer 4).*
>
> *As I said before, it is easy to get injured, diseases, and get ill. Those are the disadvantages of the WIL programme. When working on a high rise building, there are dangers of falling. There are dangers of TB infection when working in a dusty area. (Lecturer 8).*

Common amongst the responses is the dusty area which reflected that the work area was unprotected and prone to diseases. In this view, Lecturers 4 and 8 mentioned different hazards like exposure to wind and dust and work heights. The windy and dusty conditions noted by Lecturer 4 and Lecturer 8 were identified as causing infections. Therefore, the nature of learning for the civil engineering trade exposed workers to danger, requiring them to go for regular health checks. Grossman (1990) explains the knowledge of context as a deep appreciation of the environment in which teachers perform their duties and understand their environment's expectations, opportunities, and challenges. TVET lecturer learning during WIL was shaped by working conditions, long working hours, types of machines used in industry, industry culture, and working processes and guidelines. It implied that TVET lecturers had to be well equipped to deal with the industry conditions and work culture so that their learning could be effective.

Therefore, knowledge of context in this study represented the whole industry setup, including every aspect that the TVET lecturer learning during WIL needed to be aware of in their learning. While TVET lecturers learning during WIL were exposed to industry skills, they also learnt the constraints characterised by their industries. They learnt from the conditions of the various industry settings, which perhaps shaped their learning. The above lecturer comments were supported by Training Manager 2 at Company 2:

> *This environment needs healthy people who can stand the whole day on a machine without dosing or leaning because it is against the 'rules of the game'. That is why we take everyone for a medical check-up every year to ensure that they are fit to stand behind the machine.*

Training Manager 1 at civil engineering industry had this to say:

> *In any field, you need commitment, dedication, determination and focus. One says it is terrible, another says it is cool. Some dislike noise and others enjoy it. The nature of the civil engineering industry demands resilient people who enjoy working in all weather conditions.*

There was concurrence with Lecturer 4 and Lecturer 8 regarding the work environment, which was also reportedly described by the Training Managers as harsh because lecturers on WIL needed to be fit, full of determination and focus on working in all-weather conditions. They reported that "hazards like exposure to wind and dust and work heights" negatively affected their health. Scholars such as Duncan (2017) contend that a workplace is a hostile place where lecturers must receive adequate training. College lecturers cannot do this if they have not had recent experience of working under real-life conditions. The literature is in line with Lecturers 4 and 8, which was also supported by Training Managers 1 and 2.

The Training Managers suggested that TVET lecturers' learning during WIL demanded physical fitness and the ability to adapt to harsh environments. The medical check-up presented a warning sign for the environmental conditions, which necessitated a constant medical review. Electrical Lecturer 3 at Company 3 added: *"You get psychologically affected if you stay long because of gas exposure and heat"*. I observed the lecturer working on a coke-making plant characterised by coal dust, gaseous fumes and high heat. It appeared that a prolonged stay at the plant affected the physical and mental well-being of workers. On a positive note, some excerpts below indicate the conceptions of lecturers learning during WIL:

> *The environment was quite conducive for learning because I did not have any problems. All equipment was sufficient for me. When I did my trade test preparation, I had all the support I needed (Lecturer 5).*

> *The environment is conducive, I can add that I enjoyed being there, but the time was insufficient. The environment is accommodating for us. We were respected, and we got enough information as we asked questions, and no one said we were there to take their jobs. It was accommodating (Lecturer 6).*

> *I felt important going to such an environment, working with people, and in the end, they see that you are contributing positively. When they explain some things, you also give more information, so WIL made me see that this qualification is real because I could understand the meaning of theory (Lecturer 2).*

The immediate comments from lecturer excerpts above were similar and showed that the industry environment under which lecturers worked was conducive to learning during WIL. Lecturers 2 and 5 reported that they got adequate skills and an understanding of the meaning of theory. From the above excerpts, lecturers reported: "we got enough information" and "I could understand the meaning of theory". The finding was in line with sourced literature from Bergami and Schuller (2009), who reported that academics conceived WIL as an important link between theory and practice. Similarly, a welding Lecturer 7 at Company 2 said: "*I gain much practical training in my welding trade"*. The comment confirms the literature surveyed (Akudugu and Obeng 2015), noting that all lecturers acknowledged having an effective competency-based training programme in industry and viewed the training programme as useful to improve the standard of teaching.

The overall response showed that TVET lecturers learning during WIL conceived industry exposure positively towards their learning. Extracts from lecturer interviews below are representative of the conceptions of their learning through WIL.

> *The industry I attended is a world-class standard with the latest technology. It is fully equipped. It is a suitable environment for one to learn. They invest in things that assist one to learn (Lecturer 10).*

> *The environment and industry are very complex. There are different structures done, e.g. a mall, government low-cost houses, hall and roads. They are all construction but done differently and with different specifications, tools and requirements (Lecturer 1).*

Lecturer 10 suggests that the latest technology skills characterised the nature of lecturer learning during WIL. A further comment noted the high industry standard, which was fully equipped and conducive to learning. It probably implied that the TVET lecturer was exposed to universal skills of the 4IR. Lecturer 1 indicated the complexity of the civil engineering industry in terms of the sub-disciplines of specialisation. These specific specialisations may have determined the nature of TVET lecturer learning during WIL. While it is all construction industry, it appeared that the types of tools and skills on building construction were not the same as those used in road construction, which suggested that civil engineering lecturers engaged in many different skills during WIL.

The knowledge of context involved the working conditions, types of machines used in industry, industry culture, and working processes and guidelines that shaped lecturer learning during WIL. Training Managers acknowledged that the industry demanded physical fitness and the ability to adapt to harsh environments. The lecturer's responses were similar and suggested that the industry environment was conducive to learning due to the highly equipped industry environment. It appeared that the different types of tools and skills used in building and road construction suggested that civil engineering lecturers engaged in many different skills and machines during WIL.

7.7 CHAPTER SUMMARY

This chapter discussed the kinds of knowledge (general pedagogical knowledge, curriculum knowledge, knowledge of contexts, industry placement skills and soft skills) that TVET lecturers gained during WIL. During the industrial experience, TVET lecturers learnt various civil, electrical and mechanical engineering industry skills. The examples of skills that lecturers gained during WIL included building, plumbing, welding, boilermaking, refrigeration, electrical and fitting and machining. These skills included using different types of machines from where TVET lecturers gained knowledge during WIL.

Civil engineering lecturers were exposed to bricklaying, concrete mixing, roofing, plumbing, reading drawings, road construction, and quantity surveying during WIL. Company personnel confirmed that lecturers were exposed to the skills. The findings from electrical lecturers indicated that lecturers gained knowledge through connecting, testing and maintaining electrical motors, working on transformers, assembling components, troubleshooting faults, electrical wiring and interpreting drawings. Lecturers and industry personnel confirmed using machines and tools to carry out civil, electrical and mechanical engineering processes. The skills were part of GPK gained during WIL. It was noted comparatively that some machines like CNC in the mechanical industry were used under strict supervision, while the others in the civil trade were not used due to operating licence requirements. Lecturers learnt from inspection of components in the mechanical industry to check the components for adherence to specifications. Both civil and electrical engineering participants confirmed the testing of materials and components.

The installation of equipment in civil, electrical and mechanical engineering industries was supported by training managers whose responsibility ensured that TVET lecturers learning during WIL gained knowledge from various tasks. Installation ranged from trade to trade but included fitting fixtures, equipment and machinery in plumbing, electrical and mechanical trades, in position and connecting them to function, thereby forming GPK. The findings confirmed that lecturers at mechanical, electrical and civil engineering industries used relevant software in their respective areas of specialisation. Some mechanical lecturers also reported soft skills by using computer software to programme CNC machines and test the smooth running of the programmes through simulation.

Civil engineering lecturers mentioned different forms of hazards like exposure to wind, dust and work height, reflecting that the nature of the work area was open to diseases, unlike the electrical and mechanical fields. Therefore, the civil engineering trade exposed lecturers to danger, which resulted in regular and compulsory health checks. TVET lecturers learnt from the conditions of the various industry settings, which perhaps shaped their learning. The lecturers' responses were similar and suggested that the industry environment under which lecturers worked was conducive to learning due to the high industry standard, which was fully equipped and accommodating. Mechanical trades shared some similarities, especially on CNC machines, but there were some contextual differences on shape profiling. Therefore, it appeared that lecturers gained industry knowledge by engaging in various processes and exposure to sophisticated machinery. Lecturers were observed working, learning and listening to instructions from artisans. To that end, TVET lecturers learning during WIL gained different kinds of knowledge in the industry.

The findings on TVET lecturers' conceptions of their learning during WIL are presented in the next chapter.

CHAPTER 8: DATA PRESENTATION AND ANALYSIS

8.1 INTRODUCTION

This chapter presents and analyses data obtained from the participants in answering the research question, 'What are the TVET lecturers' conceptions of their learning during WIL?' The study's primary objective was to explore the nature of TVET lecturers learning during WIL (how they learn) to establish the nature of their learning, the kinds of knowledge that lecturers gained, and determine how they understood their learning. The previous two chapters discussed the nature and kinds of knowledge that TVET lecturers gained during WIL. The themes that emerged are positive aspects of WIL experience, WIL constraints, and the personal development beliefs of TVET lecturers. These themes provide a structure for the presentation and analysis of the research findings in this chapter.

Both TVET lecturers' responses during WIL and company personnel are integrated and presented together as they were broadly similar. Where contradictions occur, this is highlighted. I drew on literature to establish alignment with existing research, specifically the theory from Kolb (1984) ELT. I also used conceptual frameworks to analyse the findings through the lens of Shulman (1987) domains of teacher knowledge and the industry placement theoretical model by Bergami and Schuller (2009). From all the domains, I discuss general pedagogical knowledge, knowledge of context and curriculum knowledge, which are specifically relevant to the TVET lecturer learning during WIL. The industry placement theoretical model by Bergami and Schuller (2009) complements Kolb's theory as it helps to unpack conceptions of the TVET lecturer learning during WIL. This chapter presents and analyses the data addressing question three on TVET lecturers' conceptions of their learning during WIL.

Table 7: Themes on lecturer conceptions

Theme	Sub-theme
Positive aspects of WIL experience	New skills and knowledge Industry environment Lecturer views about WIL
Constraints of WIL	WIL support and engagement Bureaucracy and setbacks
Personal development beliefs	Industry links Knowledge enrichment

Source: Designed by the author on the themes and sub-themes of lecturer conceptions.

Note: The themes and sub-themes on lecturer conceptions are given in the table above. These were the major themes and sub-themes which were prominent in the study. They are discussed and linked to relevant literature.

The research question about the conceptions of TVET lecturers' learning is addressed through themes and sub-themes presented in **Table 7** and discussed further down the chapter. These are as follows: positive aspects of WIL experience, constraints of WIL, and personal development beliefs.

Table 8: Responses on conceptions during WIL

	Positive aspects of WIL	New skills and knowledge	Lecturer views about WIL	Knowledge enrichment	Industry environment	WIL Support and engagement	Bureaucracy and setbacks	Industry links
Lecturers	17	18	18	18	11	5	4	7
Industry Personnel	4	4	3	6	3	5	0	3
Grand total	22	22	21	24	14	10	4	10

Source: Designed by the author on the participant responses on their conceptions during WIL.

Notes: The table shows the number of responses on each sub-theme. While knowledge enrichment, views about WIL and new skills and knowledge received the highest responses, WIL support and setbacks were mentioned by a few participants.

Derived from Table 7 above, the participant responses are tallied in Table 8. Participant responses for each sub-theme are indicated and discussed under each sub-theme throughout the chapter. All lecturers indicated their different views about WIL, new skills and knowledge enrichment during WIL. In contrast, only four lecturers listed bureaucracy and setbacks, while five TVET lecturers stated WIL support and engagement during WIL. A lower response on setbacks suggests that TVET lecturers learning during WIL were generally satisfied with the industry experience. The positive aspects of WIL experience are discussed and elaborated in the following section.

8.2 POSITIVE ASPECTS OF WIL EXPERIENCE

Seventeen lecturers acknowledged some positive practices during their experiential learning in industry. Experiential learning makes meaning through direct practical learning experiences (Goudreau, Zwolenski and Duchala 2011; Thaba-Nkadimene 2017). The objective of WIL is to generate a positive learning experience that combines academic studies with learning during WIL. TVET lecturers learning during WIL engaged in carrying out various civil, electrical and mechanical engineering tasks. In doing so, they generated some understanding of their experiences during WIL. The positive aspects of WIL experience are discussed under the following headings: New skills and knowledge; Industry environment; and Lecturer views about WIL. Interview excerpts below represent TVET lecturers' conceptions during WIL:

> *You get more knowledge, skills, and how to apply the knowledge you got from academics, use tools, work and finish your tasks in time (Lecturer 3).*
>
> *I think DHET must expand this idea of WIL for TVET lecturers, maybe once every 3 years. We must be taken back to the companies to remind ourselves of work exposure and gain more skills and knowledge because we are at colleges teaching, so we grow old and forget about the other information. Going back to industry for months will help us gain the latest skills and knowledge to teach students more relevant trade skills (Lecturer 4).*

The comments immediately above indicate TVET lecturers' conceptions about TVET lecturer learning during WIL. The responses showed that the conceptions on the nature of lecturer learning during WIL were characterised by gaining skills and knowledge during practice in the industry. The responses from Lecturers 3 and 4 align with literature from Alias, Sofyan and Triyono (2020) and Mulati, Kyalo and Dimo (2019), who said vocational teachers received the latest industry insights during their practical experience. Some scholars consulted (Bergami and Schuller 2009) report that academics (TVET lecturers) conceived WIL as necessary for expanding their knowledge since they gained professional development, up-to-date industry practices and career growth. The excerpts below represent more lecturer sentiments about TVET lecturer conceptions on the nature of their learning during WIL: *"Well, I think it is a good initiative. However, we need a proper induction before we go to the plant"* (Lecturer 6).

Lecturer 2 also vented conceptions about WIL: *"I can say WIL gave us exposure to a lot of instruments and an exciting industry*". Comments from the excerpt support that TVET lecturers benefited from learning through WIL. A contradicting view was raised by Lecturer 6 that a proper induction was necessary before engaging in WIL. It agrees with highlighted comments about industry safety that lecturers attended daily safety talks before working. Literature consulted (Duncan 2017: 10) further confirms that: "Exposure to industrial workplace develops, motivates and energises TVET lecturers. They learn a lot about current technology, industrial systems and processes". While industry exposure to different equipment showed some practical engagement, Lecturer 6 reiterated what was stated in Chapter 6 about induction, which confirms the value of ensuring that lecturers were adequately introduced to the plant and equipment in a bid to prevent unforeseen accidents. Lecturer 3, Lecturer 4 and Lecturer 6 learning during WIL conceived that industry exposure provided more knowledge and proposed that TVET lecturers should engage in WIL more frequently to gain the latest practical skills. For that reason, Lecturer 2 and Lecturer 6 indicated that WIL was an excellent and exciting initiative which implied that they probably had experiences beyond their imagination. Extant literature confirms: "Workplace exposure for teaching staff at TVET institutions helps to bring the classroom curriculum into closer alignment with the skills needs of industry and motivates lecturers" (Duncan 2017: 68). Literature linked workplace exposure for TVET lecturers to the quality of classroom instruction and the ability to prepare students for the industry. However, this study does not extend to classroom practices.

The comments by industry personnel below shed light on the conceptions on the nature of learning attended by TVET lecturers learning during WIL:

> *It is good because it equips teachers with up-to-date skills to share with college students. Technology is changing fast, so this is the only way to catch up. Even if they learn at university by the time they graduate, some skills would have evolved due to evolving technology in this 4th Industrial Revolution (Training Manager 1).*

> *Attachment is a groundbreaking exercise that gives the bolts and nuts of the trade. Attachment exposes to workplace demands and challenges. They gain practical experience, work ethics, develop a professional network and understand workplace expectations (Training Manager 2).*

The comments above represent company personnel's sentiments, acknowledging TVET lecturers' conceptions of learning during WIL. Training Manager 1 emphasised gaining up-to-date skills and through evolving technology. There was concurrence on the issue of gaining skills and the latest technology in the industry. The literature surveyed (Ngwane 2016; Subbiah *et al.* 2017) suggests that participants conceived WIL as offering industrial experience and skills for the world of work. This study findings match TVET lecturer WIL placement in industry in that skills and concepts were reinforced, professional practice enhanced and skills such as teamwork, communication, self-management, problem-solving and understanding the world of work were gained (Ngwane 2016). These skills were in line with the soft skills indicated in Chapter 3. Several South African policy documents – such as the 2011 National Skills Accord, 2014, White Paper on Post-School Education and Training, and the National Skills Development Strategy for 2011 – 2016 emphasise workplace exposure for TVET lecturers. To address this notion further, I discuss conceptions around the new skills and knowledge that lecturers learning through WIL gained.

WIL was conceived as a good and exciting initiative which generated more knowledge and proposed frequent WIL engagement to gain the latest skills and knowledge. South African policy documents endorse TVET lecturer industry experience as a requirement for a professional qualification. The new skills and knowledge gained by TVET lecturer learning during WIL are discussed below.

8.2.1 New skills and knowledge

During WIL, TVET lecturers' learning through practice involved mastering new skills and knowledge in the industry. All lecturers (18) and four industry personnel listed new skills and knowledge during WIL. New skills meant using some tools for the first time and this resulted in gaining some practical knowledge. Lecturers had this to say:

> *I learnt new ways of casting, bending steel bars, welding metal, building maintenance holes from brick and concrete. I learnt paving using brick, concrete and tar. Now I can build, draw plans, stick to a work schedule, follow municipal by-laws, design steel basic structures, timber, and masonry. I can do*

surveying, setting out levelling and square houses using the 3-4-5 method (Lecturer 1).

I have gained more knowledge and skills in my skills training. I have a trade test certificate (Lecturer 4).

Attachment means getting used to different things, learning new things, and sharing ideas and views about whatever is happening at that company. I got to know new things, tackle some challenges and share knowledge through meetings (Lecturer 5).

These vignettes illustrate novel lecturer learning during WIL. Central to lecturers' conceptions was gaining new trade skills in industry during their experiential learning attachment. Research literature from Paryono (2015) says that TVET teachers in Malaysia gained industry experience, content, curriculum and teaching and learning methods. Kolb's experiential learning cycle commences with concrete experience where lecturers learnt from actual doing or using a machine for the first time. The first-hand experience through touching and doing enhanced lecturer learning during WIL. A person passes through stages repeatedly in a way that helps to learn and take new experiences into the future (Kolb 1984). Lecturer learning during WIL was facilitated when the lecturer participated responsibly in the learning process. Bergami and Schuller's model explains new knowledge and skills acquisition as the subsequent outcomes produced by WIL as expected by the TVET lecturer learning during WIL and the host company (Bergami and Schuller 2009). From literature (Bergami, Schuller and Cheok 2011), the host company may also learn how to accommodate TVET lecturers for WIL, improve future lecturer placements, and share information with lecturers who could provide insights on enhancing existing systems and processes. The WIL experience could support the academic currency in TVET teaching and learning practices, ultimately enriching the students' learning experience.

Mechanical Lecturer 4 at Company 2 highlighted attaining a trade test qualification from engaging in WIL, which implied that some TVET lecturers gained additional qualifications through the WIL initiative. Also, Lecturer 9 at Company 2 said: "*I have gained much knowledge, and I have learnt many things. I learnt new skills and innovativeness in the company"*. The sentiments raised by Lecturer 9 concur with Lecturer 4 and Lecturer 5 that they learnt new things and many skills in industry during WIL. Seemingly, TVET lecturers learning during WIL conceived gaining new skills and knowledge. Lecturer 8 added: "*I had [an] experience working with different stakeholders like architects, quantity surveyors,* *engineers and artisans – the bricklayers, plumbers, carpenters, electricians".* The TVET lecturer estimated meeting experts as a valuable experience because they would also learn to deal with practical situations. The following quotations represent the company personnel sentiments: "*They gained invaluable skills for free and used different types of tools" (Training Manager 1).* Training Manager 2 said: *"Teachers benefited from industrial experience to various machinery and got readiness for trade test".*

These comments are representative of the highlights by the TVET lecturer responses. Industry personnel supported lecturer conceptions and confirmed the use of machinery during WIL. It can be assumed that TVET lecturers' conceptions reflected learning new skills and knowledge during WIL. Lecturers acknowledged using tools, learning new processes and procedures, and attaining practical competency. The findings above resonate with research literature (Renganathan, Karim and Li 2012) that industry experience programme contributes towards developing well-rounded graduates in communication, technical know-how, solution synthesis, and entrepreneurial skills.

TVET lecturer learning during WIL involved garnering new skills and knowledge in the industry as a first experience. Crucial to lecturers' conceptions was gaining new trade skills in the industry during their practical experience. Their experience through touching and doing enhanced TVET lecturer learning during WIL. Bergami and Schuller's industry placement model explains new knowledge and skills acquisition as the subsequent results produced by WIL as expected by the TVET lecturer and the host company during WIL. The TVET lecturer WIL experience could support the academic currency in TVET. Lecturers concurred that they learnt new things and many industry skills during WIL and attained trade test qualifications from WIL engagement. The TVET lecturer conceived meeting experts as a valuable experience because they also learnt from how experts dealt with practical situations. Lecturers acknowledged using tools, learning new processes and procedures, as well as attaining practical competency. The lecturers' views about learning during WIL are discussed next.

8.2.2 Lecturer views about WIL

TVET lecturers were exposed to civil, electrical and mechanical engineering industries during WIL. All lecturers (18) stated their views about their learning through practice where they gained related trade experiences. The interview excerpts below reflect their conceptions about WIL:

> *Yes, yes! I highly recommend my colleagues to do the WIL there because there is a lot to learn, especially some of our colleagues who have not been exposed to the industry as they are coming from varsity they 'do not have a trade test like us. I can highly recommend it, but they must allocate us at least 3 months in industry to grasp many new things, maybe every three years or so (Lecturer 6).*

> *WIL enriches lecturers in terms of knowledge because there are many transformations in industry now. Machines are changing through technology. So machines can be able to do things for themselves. Some machines are no longer used in the industry now like your shaping machines. We now have CNC, milling machines and centre lathe machines. So for the lecturer to go there, it would help the lecturer. It will enrich the lecturer's knowledge (Lecturer 9).*

Lecturer 6 recommended that TVET lecturers learnt through WIL, citing many benefits attached to the exposure. Furthermore, the lecturer suggested more industry placements periodically so that they keep updated. Sourced literature (Duncan 2017; Mabhanda 2017) confirms that industrial attachment enhances TVET lecturers' skills and makes TVET lecturers feel empowered by the industry experience and usually want to experience more. Lecturer 9 highlighted the contrast between obsolete machines versus the new CNC technology and in the process identified many industry transformations. Therefore, WIL aligns lecturer knowledge with current technology. Both Lecturers 6 and 9 from the mechanical trade concur that WIL was indispensable for TVET lecturers in enriching their knowledge through industry practice. Lecturer 4 at Company 2 shared the same sentiments: "*I will recommend my colleagues to do attachment because I was exposed a lot so that they will learn a lot of skills relevant to their trades"*. The comments from Lecturers 4, 6 and 9 echo the same view that they would recommend TVET lecturers to engage in WIL in the same industries. It implies that WIL becomes popular and accepted by lecturers leading to a TVET workforce with industry exposure.

Electrical Instrumentation Lecturer 2 at Company 3 added his conceptions about WIL: *"My view is that industrial attachment is critical because it gives that learning space to apply all the theory in industry. It allows problem-solving ..." (Lecturer 2).* Through experiential learning, lecturers had an opportunity to learn practical skills, which were apparently lacking among the TVET lecturers. Therefore, the commendation aimed to ensure that TVET lecturers engaged in WIL to gain valuable practical skills. Lecturer 8 at civil engineering Company 2 raised the same sentiments:

> *I recommend my colleagues to do WIL because most lecturers are talking about things they have not experienced. They have seen only in the textbook. It is good to speak confidently about something you have touched.*

The above comment was also confirmed by Lecturer 1 from Company 1, who said:

> *I did not have courage, but after WIL, I gained the confidence to work with basic hand tools and construction machinery.*

The civil engineering Training Manager 1 at Company 1 commented on the nature of learning for TVET lecturers during WIL:

> *Having trained them in all areas of civil engineering, I will say now they are teachers who can safely go and correctly teach our kids confidently. WIL is the right thing to do. More teachers must receive training and go away rich in skills and knowledge.*

The views shared by Lecturer 8 and Training Manager 1 were similar to what was said by Lecturers 4, 6 and 9 regarding recommending that lecturers engage in WIL. Lecturer 8 concurred with Training Manager 1 that lecturers learning during WIL built the confidence to speak about practical concepts in class. The issue of confidence, which appears in the above excerpts, aligns with the conceptual framework on soft skills, which enhance practical skills learning (Ellis, Kisling and Hackworth 2014; Ibrahim, Boerhannoeddin and Bakare 2017). The above comments from Lecturer 8 align with literature from Mabhanda (2017: 159), who notes: "Lecturers must undergo industrial training attachment to bridge knowledge gaps. Attachment of lecturers helps overcome lagging in new technology available in industry ceteris Paribas". Ceteris Paribus generally means ‘all other things being equal’. Lecturers were described as nervous about their initial experience with machines, and Lecturer 1 attested to that, citing a lack of courage and gaining confidence during the WIL experience. The lecturer gained the confidence to expedite work activities using the equipment. The findings concur with the literature consulted (Duncan 2017: 10), which confirms that: "Exposure to industrial workplace develops, motivates and energises TVET lecturers. They learn a lot about current technology, industrial systems and processes".

Lecturer 2 at Company 3 commended TVET lecturer WIL and said:

> *The industry was a perfect environment for learning because there is a solid support base from supervisors. Colleagues from the training centre put forward their wealth of knowledge. We also presented ours from the university and combined the expertise and shared good practices. We learnt the things that industries do, which made it a conducive environment for learning.*

Mechanical Lecturer 9 at Company 2 also said:

> *WIL is good and what I can say is that it is something that must happen every time. I would say it must happen twice a year. The first semester and the last semester or three times a year-every trimester because lecturers are building the nation by teaching innovation about the new machines and the new processes taking place in industry.*

The results align with Alias, Sofyan and Triyono (2020), who said: “vocational teachers received the latest industry insights during their practical experience”. The findings immediately above are in line with research literature supporting that: "Lecturers should be trained and retrained to keep them abreast with the current trends in technology and industrial development for effective service delivery" (Mabhanda 2017: 164). The response from TVET lecturers learning during WIL commended WIL as a good engagement worth repeating. These comments confirm the literature surveyed (Van der Bijl and Taylor 2018) that some lecturers completed a second placement which reinforced their practical skills and ability to explain concepts better. Lecturers shared knowledge and industry practices by putting their ideas together and sharing acceptable industry practices. Lecturer 9 learning during WIL conceived WIL as a good exercise that TVET lecturers should engage periodically to improve their skills. The recommendation supported earlier propositions that lecturers needed to be updated with current technology. Lecturer 6 at Company 2 added: *"It is a good initiative. It is enlightening in many ways to grow the lecturer and improve the lecturer in terms of being exposed to different kinds of industry operations"*. TVET Lecturer 6 and Lecturer 9 learning during WIL conceived WIL as a good initiative to understand practical industry exposure. Interview extract from Lecturer 5 at Company 2 presented the following:

> *WIL is quite beneficial. You get to know and broaden your knowledge. You meet new challenges and new things, which keep you up-to-date with the changing technology. People go for WIL to gain experience and expertise since technology is changing daily.*

The findings of this study agree with the findings of Duncan (2017: 68), who said: "Workplace exposure for teaching staff at TVET institutions helps to bring the classroom curriculum into closer alignment with the skills needs of industry and motivates lecturers". The finding immediately above is in tandem with sourced literature (Mabhanda 2017) that industrial attachment equips TVET lecturers with new technology and new methods of teaching TVET education. There was an acknowledgement of learning during WIL, which broadened their knowledge and kept them updated with revolving technology, as stated by Lecturer 9 above. Boilermaking Training Officer 2 at Company 2 reported: "*Lecturers gain practical experience that will benefit them throughout their careers".* The Training Officer suggested that the lecturer gained life skills that they could use over a long time. The literature surveyed (Swiss-South African Cooperation Initiative 2016b; Duncan *et al.* 2017) recommend that placements for TVET lecturers in the industry demonstrate that WIL is a strategy that deserves adoption.

Some lecturers learning during WIL suggested more periodic industry placements to keep updated with industry skills. Duncan (2017) and Mabhanda (2017) confirm that industrial attachment enhances TVET lecturers' skills and they feel empowered by the industry experience and usually want to experience more. Lecturers conceived that WIL aligned their knowledge with current technology. Hence, it was good for TVET lecturers to enrich their learning through industry practice. During WIL, lecturers were perceived to build confidence through WIL to understanding the explanation of practical concepts. TVET lecturers learning during WIL commended WIL as a good engagement and initiative worth repeating where they learnt practical skills in industry. The constraints experienced by lecturers during WIL are discussed below.

8.3 CONSTRAINTS OF WIL

While there were notable benefits for TVET lecturers learning during WIL as described by participants, lecturers' engagement in the industry had its challenges. The constraints are discussed under the following sections: WIL support and time allocation, and bureaucracy and setbacks. Lecturer learning during WIL was affected by the level of support received and time allocated to lecturers to attend WIL in the industry.

8.3.1 WIL support and engagement

TVET lecturer learning during WIL depended on the amount of support they received while engaged in experiential learning. Five TVET lecturers acknowledged receiving limited WIL support and engagement during WIL. Generally, the support given in any initiative can be a vehicle for success. A boilermaking Lecturer 4 Company 2 said:

> *There was a lack of support from colleagues; for instance, the semi-skilled workers behaved like we were there to take their jobs. They were angry at us and did not like us at all. The semi-skilled workers would refuse to assist us when we asked for help. Supervisors were not directly involved, as we had mentors to guide us. It was hard to find help if you needed a supervisor. We followed protocol and reported to a mentor. Even if the mentor had problems, you had to tell him all concerns, the supervisor, and the foreman.*

Lecturer 9 at Company 2 reported:

> *The general attitude among employees was not right as they did not generally like us; they did not give us fair treatment. There was a lack of commitment from managers in the company as they said we were not part of the company, and it was the responsibility of the SETA to ensure, e.g. replacement of worn PPE. They did not give us everything we needed.*

The responses immediately above from lecturers at Company 2 indicated a lack of fair treatment and bad attitude from company personnel that they worked with on their daily duties. The findings are in tandem with literature from Smith (2017: 26) that: "They could not believe I was coming for practicals. They thought maybe I was coming to take their jobs. They were quite reluctant to show me things". It may explain why some industry personnel were hostile to TVET lecturers during WIL. The responses showed that the semi-skilled workers felt threatened that the TVET lecturers would take their jobs. I would assume that the semi-skilled company personnel did not give support because they acknowledged the value of WIL and possible chances of progression for TVET lecturers. To mitigate these challenges during WIL, this study proposes a TVET lecturer WIL implementation model. The model outlines stakeholders who would have information regarding lecturer WIL training in the industry. Further details of the model are furnished in Chapter 9.

Lecturers 4 and 7 conceived that company supervisors were not committed to ensuring they received everything they needed to work safely, like personal protective equipment (PPE). Lecturer 2 at Company 3 reported an excellent support base from supervisors, making the environment conducive to learning during WIL. I observed everyone with full PPE, and the company safety stringent rules were displayed everywhere to ensure compliance with safety protocols. When I probed Lecturer 2 for clarity, it was noted that it was the college responsibility to provide PPE for WIL lecturers. However, one plumber at Company 1 was observed conflicting the working on heights rule without having assessed the risks and not using the harness.

The excerpts below show the responses from TVET lecturer learning through WIL:

> *Bad things, well, bad things. Aaah, some supervisors who are unwilling to help or might feel that you might be wasting their time, and there you will be disadvantaged. Sometimes they do not give you the knowledge you want but give the knowledge at the surface because they will not have time to attend to you because of other company demands (Lecturer 5).*

The issue of support was further highlighted by mechanical Lecturer 5, who conceived that company supervisors failed to share information in-depth due to the demands of their company responsibilities. In this view, it seemed the semi-skilled employees mentioned might have intentionally chosen not to assist TVET lecturers on WIL. At the same time, the supervisors referred to by Lecturer 5 may have been overwhelmed by their company primary duties.

8.3.2 Long working hours

This theme emanated from the question, “Tell me your thoughts about industrial attachment”? Lecturer 6 reported:

> *The bad part is when you leave before knock-off time because we use a schedule for the college. It was not ideal. You have to leave a job in the middle while others are busy working, portraying a wrong impression. The college did not provide transport, and if we were paid at least, we could finish work late with others than leave early.*

Training Manager 1 raised similar comments about working hours:

> *"The knock off times need to be aligned to company times because once they come here, they have to follow company times for conformity and compliance, but our efforts to correct it were fruitless".*

The comments by Training Manager highlighted that lecturers had to follow company operating hours to maximise their learning by spending most of their time onsite. Lecturer 9 said: “*You know, I am not used to working six to six, Saturday and Sunday”.* Lecturer 10 added: "*Not much of bad things except that time issue where you start at 7:30 am to 4:30 pm".* The findings align with the literature surveyed (Duncan 2017), confirming that TVET lecturers are seldom there long enough to perform demanding work to develop technical skills. The working hours in the industry were longer than the standard working hours for TVET lecturers in colleges.

The working hours in the industry were longer than the standard working hours for TVET lecturers in colleges. While TVET lecturers' knowledge and understanding of the industry is usually improved by their time in the workplace, it appeared that lecturers did not spend full hours in the industry. According to industry operational procedures, TVET lecturers learning during WIL did not adjust to the working hours. The Training Manager's response highlighted that lecturers had to follow company operating hours to maximise their learning. A proposed model in Chapter 9 aims to elucidate the proposed path followed by TVET lecturers on WIL to maximise their training opportunities.

In this view, Tshewang (2021) clarifies in a study that company technicians and supervisors were suspicious of the knowledge and skills of lecturers and made them do work that was apparently irrelevant to their field of study or work on menial jobs without doing the essentials of the job. The responses suggest that some company supervisors were supportive though limited by their core duties to ensure company operations were not disrupted. However, sourced literature (Sewell, Venter and Mason 2015) report that almost half of the host companies surveyed were not familiar with the concept of WIL. Lecturer 6 conceived that the knock-off time for lecturers on WIL was not convenient for their learning because they had to leave an incomplete job due to their limited working hours. Besides painting a bad image on the company personnel, lecturers would probably find that job completed the next day, which negatively compromised their learning during WIL.

The time factor was also expressed by other lecturers who said: *"What was bad always was the time and the noise as well. You know, I am not used to working six to six, Saturday and Sunday"* (Lecturer 9).

Another element of time was highlighted by Training Manager 2 at Company 2: "*Their time is short. They need at least a year to a year and a half, but due to the tight programme it was not possible".* Citing the amount of work that lecturers learnt during WIL, Training Manager 2 suggested extending their attachment period to increase the chances of gaining more skills through practice. Plumbing Lecturer 11 at Company 1 reported:

> *There is a challenge of a shortage of tools, workers, materials, and these can be avoided if proper planning was done. However, fortunately for me, I have the tools to complete my tasks (Lecturer 11).*

The shortage of tools, referred by Lecturer 11, limited the nature of lecturer learning in that they were unable to follow correct procedures when working on their tasks due to a shortage of tools. The theoretical model by Bergami and Schuller (2009) shows that industry placement experience for TVET lecturers learning during WIL may develop a community of practice (CoP). The community in this study implied the participation in tasks where lecturers and artisans shared understanding about the work before them. Bergami and Schuller's industry placement model describes community engagement between the TVET college, the TVET lecturer on placement and the host company. Industrial placement is an indispensable component of developing college lecturers' competencies in their areas of specialisation. The process could achieve the desired results if strong linkages promoted all stakeholders' participation more productively (Tshewang 2021). Through community engagements, relationships were created, which led to further engagements beyond WIL duration, as explained in section 8.4 below.

TVET lecturer learning during WIL was apparently affected by the level of support received and time allocated to lecturers to attend WIL in the industry. The responses showed that the semi-skilled workers felt threatened that the TVET lecturers would take their jobs. Smith (2017) states that some company personnel were quite reluctant to show things in fear of losing their jobs. Some supervisors were reportedly not committed to ensuring that they received everything they needed to work safely, like PPE. The company supervisors reportedly failed to share information in-depth due to the demands of their company responsibilities. Overall, they were supportive though their core functions limited them to ensuring uninterrupted company operations. Some lecturers raised concerns about long working hours in the industry compared to college times. It appeared that lecturers did not quickly adjust to the working hours according to industry operations. Participants recommended a longer WIL duration so that lecturers benefited from the practical exposure. The plumbing lecturer indicated a shortage of different tools and other resources, which was blamed on poor planning. The community in this study implied the participation in tasks where lecturers and artisans shared understanding about the work before them. To this end, Blom (2015) recommends an urgent need for a clearly defined national WIL policy and placement modalities.

8.3.3 Bureaucracy and setbacks

Four lecturers raised concerns over their learning during WIL. Electrical Lecturer 3 at Company 3 said: "*Racial discrimination. We were not treated the same based on race…*". The electrical lecturer conceived the treatment of employees as prejudiced towards a particular race group. It appeared that the company personnel did not embrace different racial groups. Malale and Gomba (2016) revealed similar findings inherent in WIL participants who downgraded and undermined small businesses owned by Africans, yet the companies provided hands-on experience. Welding Lecturer 7 at Company 2 added:

> *There is industry politics; sometimes, the skin in the plant is working, especially on the hard jobs and skilled tasks. I will not lie that this thing will not come to an end.*

The TVET lecturers conceived that their learning during WIL was disadvantaged by what they observed as unfair racialised treatment. While lecturers may have taken it negatively, they benefited from that experience because they were exposed to hard jobs. Hard jobs are explained as difficult tasks which needed physical fitness and not much thinking. From a further probe to verify comments from Lecturer 7, it was described that the techniques to solve skilled tasks in industry were not availed to everyone, so the knowledge command remained in the hands of a few. Lecturers had to report to their immediate supervisor, who would further escalate their concerns. Refrigeration Lecturer 10 at Company 3 reported:

> *My institution gives support, but it could be futile if you do not go behind them. You might end up not completing it. I have been communicating with my central office for two weeks to pay for the training centre to complete my trade test, so communication is frustrating when they tell you about protocols.*

The lecturer referred to challenges faced by the college in ensuring that all the processes to complete WIL were in place. A complete WIL process was achieved when a lecturer eventually wrote a trade test. It meant that one had acquired practical skills to the full satisfaction of the department of labour. Upon member checking, I noted that Lecturer 10 passed a trade test and obtained a refrigeration trade certificate. The Training Manager 1 at Company 1 disagreed with the reporting structure followed by lecturers learning during WIL as it derailed their workplace relations and possibly undermined their responsibility. Commenting on institutional support, Schüller and Bergami (2020) stated that a lack thereof for industry placement was the main barrier that impeded professional development to occur. The quotation below represents the sentiments:

> *The reporting structure where they report to someone not on site when taking leave is not right. They must forget about the college protocols and start a new life here because we are in charge (Training Manager 1).*

TVET lecturers contacted their college WIL officer on matters that directly affected them at the company where they were placed for industry exposure. However, in my view, lecturers were supposed to inform their immediate company personnel supervisors to show maturity and maintain a good working relationship. Besides learning practical skills, TVET lecturers learnt effective communication and other soft skills listed in the conceptual framework chapter.

The electrical lecturer conceived the treatment of employees as discriminatory towards a particular race group. The communication channel was also a concern because lecturers reported their college WIL officer, creating a gap between them and the company supervisors.

8.4 PERSONAL DEVELOPMENT BELIEFS

The nature of TVET lecturer learning during WIL led to their personal development through knowledge enrichment. They gained contacts with the industry so that they were frequently updated on the latest developments. I discuss industry links and knowledge enrichment of TVET lecturers below.

8.4.1 Industry links

Industry links kept TVET lecturers in contact with industry personnel so that lecturers had a reference point for updated engineering news. Seven lecturers confirmed having developed industry links through practice during WIL. Through the updates, lecturers developed an understanding of the current engineering developments. Scholars like Mabhanda (2017) contend that WIL improves effective partnerships with industry, leading to college-industry workshops and conferences. Fostering synergies between TVET lecturers learning during WIL and company personnel certainly keeps the TVET curriculum continuously updated in line with the current industry demands. Comments by a mechanical lecturer below present conceptions of the nature of learning for TVET lecturers during WIL:

> *It makes me explore further to interact with industries on the latest innovations so that as I am working, I am updated with current engineering news. I network with my suppliers to give me the latest technology, obviously hard copies of engineering newsletters and emails to keep updated (Lecturer 9).*

The interaction of lecturers with industry personnel kept them updated with current engineering news so that lecturers could relate their knowledge to the latest technology. The latest innovations involved information on current engineering practices like introducing new machines and methods. This information could be found in the engineering news bulletins that the lecturer received from company contacts. Furthermore, Lecturer 9 said: "*I meet with artisans and foremen that I know to see what is happening in industry. I can share knowledge with my students"*. The mechanical lecturer had an opportunity to consult with company personnel contacts and sourced information on industry developments. The results of my study also support the findings (Mabhanda 2017; Van der Bijl and Taylor 2018), specifically the fact that some lecturers started to explore their future collaboration possibilities with industry personnel in the form of guest lecturing in TVET colleges. In addition, civil engineering Lecturer 8 at Company 1 said: "*We are in the fourth industrial revolution, and things start changing in industry, so we need to visit industry and get updated on what is happening and not fall behind on developments"*.

The fourth industrial revolution was mentioned by Lecturer 10 earlier, which focuses on the dawn of a new universal technological revolution. Innovations are developed in different fields of engineering, bringing in the use of new material technologies. All the interview excerpts above speak to industry links that lecturers were exposed to in the WIL attachments. The comments are in tandem with the element of industry networks and Bergami and Schuller's model on industry placement. Bergami and Schuller (2009: 70) explain industry networks:

> The placement experience provides the academic with real opportunities for developing strong industry networks with colleagues in the host firm that, if nurtured and maintained, have the potential to be a powerful resource in the classroom teaching and learning environment. Additionally, these networks may provide future collaborative opportunities on other projects, not only limited to the host firm, thereby possibly resulting in a 'widening' of the membership of the CoP.

Scholars (Bergami, Schuller and Cheok 2011) cited in the literature add that the lecturer on WIL has an opportunity to develop relations with the host company during and after the industry placement experience. The model clarifies that CoP may encourage interaction between TVET lecturers learning during WIL and company personnel (artisans, supervisors and engineers) so that abstract theories in textbooks could be explained concerning business practices. Simultaneously, TVET lecturers could use CoP to keep abreast with innovations and industry trends (Bergami, Schuller and Cheok 2011).

Bergami and Schuller's model clarifies that CoP may encourage interaction between TVET lecturers learning during WIL and company personnel (artisans, supervisors, and engineers) to explain abstract theories in textbooks about business practices. The results of my study are consistent with the findings of Jahonga, Canute and Murey (2016), who note that poor linkage between the industry and TVET lecturers leads to skill mismatch and underdevelopment.

8.4.2 Knowledge enrichment

Lecturers gained knowledge in their different areas of specialisation during the attachments. All the eighteen lecturers confirmed that their knowledge was enriched during WIL. The experiential learning industrial attachment enriched their subject matter knowledge. A boilermaking lecturer's views are represented below:

> *I learnt how to speak appropriately, whether it is verbal communication or what? I also learnt report writing which I did not know. I gained communication skills to talk to my colleagues and superiors. If I had something to share, I followed the organogram protocols. I also learnt about developments, sketches, different fabrications, machine operations, welding – different types of welding – arc, CO2, and argon (Lecturer 4).*

Lecturer 9 at Company 2 said:

> *WIL means enriching lecturers with more knowledge because the things that we are teaching are happening in industry. I have learnt to communicate with colleagues, you know. I learnt to respect as well. I have also learnt how to work in a multicultural environment.*

At Company 2, Lecturer 6 presented conceptions of learning during WIL:

> *My learning experiences were a significant benefit because I could use that experience to link it with classroom lecturing lessons. I greatly benefited from using new machines and processes, which gave me more ground when giving my examples in class. I managed to eliminate old processes from my teaching examples.*

Lecturer 4 and Lecturer 9 presented similar sentiments about learning to communicate in different ways. The nature of learning during WIL involved following company management protocols. Lecturer 4 conceived that communication was done through authority, while Lecturer 10 regarded following too many protocols as a disadvantage because one would not get responses on time. Generally, lecturers found WIL as a way of enriching their knowledge through practice and proper communication channels. Lecturer 7 at Company 2 acknowledged gaining experience in industry: *"I have got much experience of what is happening in the industry"*. Training Managers supported that lecturers gained skills during WIL. Implicit in the responses immediately above was a desire for enhancing teaching and learning practices. The following interview extracts represent their views:

> *These people just got a fortune. They were exposed to different sector functions. They can do any construction job you can think of from casting types, building structures from brick and concrete, paving using brick, concrete and tar and road construction, foundations and trenching. They came with theoretical knowledge that is not used today because the industry moves with time, but your books do not change. Some of the things in books do not apply today (Training Manager 1).*
>
> *The real game-changer is the rise of CNC technology, where companies automate their cutting and manufacturing operations. There are plasma cutters, milling, lathe and grinders. Due to the cost, most companies do not have CNC, but its performance cannot be underestimated. In short, the WIL is good for lecturers to get exposed and refresh skills or get the skills if they have not been exposed before (Training Manager 2).*

Training Manager 1 metaphorically used a fortune to describe the WIL benefits that TVET lecturers gained during WIL. There was confirmation that civil engineering lecturers were exposed to an entire range of civil engineering skills. 'Moving with times' probably meant that the industry had the latest technology from which the TVET lecturers learnt since they had seemingly outdated textbook knowledge. Van der Bijl and Taylor (2016) agree that the content sometimes contradicts industry practice because of obsolete curricula. The comments confirm literature sourced (Duncan 2017) that lecturers who spend time in industry benefited from acquiring current industry knowledge, skills and experience and gained professional pride and status. In a similar vein, Van der Bijl and Taylor (2018) report that TVET lecturers had an opportunity to develop themselves professionally and improve their qualifications. The mechanical Training Manager 2 agreed that WIL was good for TVET lecturers learning during WIL. The lecturers were exposed to automated machinery that concurs with Lecturer 9, who also said they gained new experience using the latest technology.

Some lecturers conceived that WIL taught them to communicate in different ways, following management protocols and lines of authority. Generally, lecturers found WIL as a way of enriching their knowledge through practice and proper communication channels. There was confirmation that civil engineering lecturers were exposed to almost all civil engineering skills. The lecturers were exposed to automated machinery and gained new experience from using the latest technology.

8.5 CHAPTER SUMMARY

The positive aspects of the WIL experience were discussed under new skills and knowledge, industry environment, and lecturer views about WIL. The responses showed that the conceptions on the nature of lecturer learning during WIL were characterised by gaining skills and knowledge during practice in the industry. Lecturers conceived the following:

- Industry exposure gave more knowledge and proposed frequent engagement in WIL to gain the latest skills and knowledge.
- WIL was a good and exciting initiative.
- Meeting experts provided valuable experience because they learnt from how experts dealt with practical situations.
- WIL aligned lecturer knowledge with current technology; hence, it was good for TVET lecturers to enrich their knowledge through industry practice.

Central to lecturers' conceptions was gaining new trade skills in industry during their experiential learning stint and attained trade test qualifications from WIL engagement. The first-hand experience through touching and doing enhanced lecturer learning through Kolb's concrete experience. Bergami and Schuller's model explains new knowledge and skills acquisition as the subsequent WIL results expected by the TVET lecturer and the host company. The WIL experience could support the academic currency in TVET teaching and learning practices, ultimately enriching their learning experience.

Through practice during WIL, some TVET lecturers commended WIL as a good initiative worth repeating and suggested more periodic industry placements to keep updated with industry skills. Duncan (2017) and Mabhanda (2017) confirm that industrial attachment enhances TVET lecturers' skills and they feel empowered by the industry experience and usually want to experience more. During WIL, lecturers nurtured confidence through WIL to speak about practical concepts in class.

Overall, company personnel were supportive though limited by their core duties to ensure company operations were not interrupted. Participants recommended a longer WIL duration for more practical exposure. Bergami and Schuller’s model described community engagement between the TVET College, the TVET lecturer on placement and the host company and encouraged interaction between TVET lecturers on WIL and company personnel (artisans, supervisors and engineers) so that abstract theories in textbooks could be explained pursuant to business practices (Bergami, Schuller and Cheok 2011). The lecturer on WIL had an opportunity to develop ongoing relationships with the host company during and beyond the industry placement experience. Through WIL, TVET lecturers kept abreast with innovations and industry trends.

The next chapter explains TVET lecturer learning during WIL by juxtaposing the findings against the theoretical framework and literature, drawing some conclusions, and synthesising the study.

CHAPTER 9: CONCLUSION, SUMMARY AND RECOMMENDATIONS

9.1 INTRODUCTION

The purpose of the study was to explore TVET lecturer learning during WIL, specifically to establish the nature of their learning, the kinds of knowledge they gained, and determine how lecturers understood their learning. TVET lecturers were attached to different industries to gain industry experience. The purpose of exposure to industry for TVET lecturers was to equip them with essential, critical skills and the latest technology. During the attachment period, the TVET lecturer learning through WIL developed competencies in their specialisation areas (mechanical, electrical and civil) by working under the experience and guidance of industry personnel. The previous chapter covered the conceptions of TVET lecturers learning during WIL. The conceptions were characterised by gaining skills and knowledge during industry practice. TVET lecturers conceived that WIL aligned their knowledge with current technology; hence, TVET lecturers could enrich their knowledge through industry practice.

South African Council for Educators (2011) explains that TVET college lecturers need to be developed to meet industry expectations. They were found to have no practical training or had teacher training specifically designed for school teachers. WIL could assist TVET lecturers in reflecting critically and becoming knowledgeable about the demands of their students. While WIL is intended to offer TVET lecturers some learning opportunities in the industry, this study established that learning during WIL was appropriate to their lecturing context. Moreover, Taylor (2017) speculates that TVET lecturers are more motivated, confident and competent with current industry knowledge and experience, creating a closer alignment between the college curriculum and industry requirements. The speculation drives the need to explore TVET lecturers learning through WIL.

Wedekind and Watson (2016) contend that TVET research in South Africa has generally been produced by a relatively small group of researchers and is comparatively underdeveloped. Further, there is a dire need for research in the TVET sector since there is almost no research that has been conducted in industry trainers' public domain. Therefore, this study adds to the existing literature pool on WIL for TVET lecturers and influences policy on TVET lecturer training and the minimum practical qualification expected of lecturers. The study could further clarify and enhance the potential of WIL by proffering an accurate account of reality gleaned from the findings.

WIL is a relatively new initiative in South Africa. There has not been substantial research into the areas indicated by Wedekind and Watson above. Advocates such as Wedekind and Watson (2016); Papier (2017); Blom (2015); Swiss-South African Cooperation Initiative (2013) acknowledge the limited research and the need for more to interrogate the feasibility of WIL. These proponents, except Blom, have studied the current situation contributes in narrowing the gap between what and how TVET lecturers learn through WIL, the TVET Colleges in South Africa and the college lecturers (Wedekind and Watson 2016).

As I conclude my study, the following questions are answered:

- How do TVET lecturers learn through WIL?
- What are the kinds of knowledge gained by TVET lecturers learning through WIL?
- What are the conceptions of TVET lecturers learning through WIL?
- What could be a suitable model for TVET lecturer WIL implementation?

The findings suggest that TVET lecturers benefited from industry experience. It emerged from the findings that lecturers gained knowledge and skills from industry practical training during WIL. Kolb's theory helped me to understand the nature of TVET lecturer learning through WIL. The conceptual framework also assisted in identifying and interrogating the kinds of knowledge gained through WIL.

This chapter focuses on important findings analysed and presented in the previous data analysis chapters 6, 7 and 8. The current chapter's discussion is presented under the following headings: methodological reflections on the study; review of the study; discussion of the key findings; recommendations based on key findings; contributions of the study; recommendations for further study; and the Conclusion.

9.2 METHODOLOGICAL REFLECTIONS ON THE STUDY

This study explores TVET lecturers learning through WIL in three TVET colleges in KwaZulu-Natal, South Africa. The research is located in the interpretive paradigm explained by Cohen *et al.* (2011) as concerned with understanding the world from individuals' subjective experiences. A multiple case study design was adopted. Although the multiple case study was expensive and time-consuming, I understood the similarities and differences between the cases, the generation of contrasting or similar results, and better understand the phenomenon under study (Yin 2003; Gustafsson 2017). My study used the qualitative research approach. Data were generated using interviews and non-participant observations. The data were analysed qualitatively using the inductive process of organising data into themes. Through the method used, I was able to analyse data within each situation and across different contexts. The non-participant observations were valuable because I gleaned the industry's real situation and made comparisons with interview responses. Data transcription immersed me into the data, providing ownership and understanding of the entire array. Moreover, the interviews gave direct contact with participants to hear their experiences. Member checking offered me an excellent opportunity to verify the quality of the data. Member checking inaugurates engaged understanding of the participant responses (Creswell 2013; Seidman 2013).

The interview was the best way to generate data from participants as it allowed the capturing of emotions and behaviours. Other methods could not do so. Therefore, I was convinced that this was the most suitable instrument to use for data generating. To strengthen my interview process, I could have employed a research assistant to help me through the process. Research assistants can help to generate data and maintain accurate records of interviews (Turner 2010). However, since WIL is relatively new, I could have used an online survey method to reach out to more participants engaged in WIL and obtained their views. Lobe, Morgan and Hoffman (2020) support that online surveys are fast, better, cheaper, and easier to generate data.

9.3 REVIEW OF THE STUDY

Chapter 1 offered an introduction and overview of the study. The key aspects included: background, context, rationale, problem statement and purpose of the study. This research was located in the South African context. Furthermore, the critical questions that the research intended to answer were outlined. A defence for my study was also presented.

Chapter 2 presented surveyed literature to establish scholars who researched TVET college lecturer WIL internationally, regionally and in South Africa. It emerged that industry WIL provided different learning opportunities for TVET lecturers. Globally, Australia has confirmed that vocational teachers were not given time off to go on WIL but made their own free time for WIL. Regionally, different lecturer WIL initiatives were implemented. A shortage of host employers impeded the success of WIL in the region (Qonde 2014). In South Africa, available literature indicated that TVET lecturers learnt industry skills during WIL.

Chapter 3 examined the theoretical framework on Experiential Learning Theory by Kolb (1984), which foregrounds my study. A conceptual framework related to domains of teacher knowledge by Shulman (1987) and expanded by Grossman (1990) was used to understand what knowledge the TVET lecturers learnt. The teacher industry placement theoretical model by Bergami and Schuller (2009) unpacked the TVET lecturer experiences during WIL. The model provided three relevant aspects for lecturer learning in industry: industry placement experience, industry placement skills and relating theory into practice.

Chapter 4 discussed the research methodology, paradigm, research design, approach, instruments, data analysis and ethics. Issues of trustworthiness, credibility, transferability, dependability, confirmability and triangulation were discussed in relation to the study. Transferability was promoted through thick descriptions of the research sites. The ethical considerations discussed how participants were protected during the data generating process.

The research sites were discussed in Chapter five. They were all located in KwaZulu-Natal province, based on their proximity to my location. All the sites were government TVET colleges, which mainly relied on state funding. The chapter gave a brief profile of the TVET colleges' programme offerings, geographical locations, and economic contexts. The site selection depended on participant availability, accessibility, and proximity of the site.

Chapter six presented and analysed results on the first research question around the nature of TVET lecturers learning through WIL. The results helped to understand how TVET lecturers learnt through WIL. Chapter 7 focused on analysing interview results for question two on the kinds of knowledge gained through WIL. The kinds of knowledge gained by the lecturer in the industry were put to the fore - what they learnt in industry. Data analysis and interpretation of chapter eight referred to interview results for question three on the conceptions of TVET lecturer learning through WIL. The conceptions were explained through themes and sub-themes.

Chapter nine presents conclusions, recommendations and the limitations of my study. The research suggests recommendations for further study gleaned from an informed perspective to enhance TVET lecturer experiences through WIL. The main findings from relevant literature and qualitative data analysis were summarised. The contribution and conclusion of the study are generated from the research questions.

9.4 DISCUSSION OF THE KEY FINDINGS

The study focused on the nature of TVET lecturer learning during WIL to determine how the lecturers understood their learning. The critical research questions guiding this case of three TVET colleges in KZN province were:

- How do TVET lecturers learn through WIL?
- What are the kinds of knowledge that TVET lecturers gain through WIL?
- What are the conceptions of TVET lecturers' learning through WIL?
- What could be a suitable model for TVET lecturer WIL implementation?

The answers to these questions frame the next section by summarising the findings. From the discussion chapters above, the following key findings were illuminated:

Table 9: Key research findings

	Key findings
1.	Lack of technical skills among lecturers in operating machines and equipment**.**
2.	Industry induction processes promoted WIL and self-directed learning in the TVET sector.
3.	TVET lecturers who participated in the training gained knowledge about industrial processes.
4.	WIL improved knowledge and practice of safe working procedures.
5.	The lack of interpersonal skills in the TVET industry was addressed.
6.	There was creativity and cost-saving skills among civil engineering TVET lecturers.
7.	WIL offered problem-solving skills to TVET lecturers.
8.	WIL generated evidence of the use of work schedules.
9.	Training helped in the formation of industry connections.
10.	Recommendations to colleagues about WIL.
11.	Lack of lecturer WIL support.

Source: Designed by author from key research findings

Notes: The key research questions generated responses from TVET lecturers and industry personnel that were similar, and these are integrated and discussed in situ.

The first key finding that emerged from the data analysis is a lack of skills among lecturers in operating machines and equipment during WIL. Each one is discussed below.

9.4.1 Lack of technical skills among lecturers in operating machines and equipment

The findings identified the lack of technical skills in operating civil, electrical and mechanical engineering machines when lecturers arrived in the industry. There were significant challenges for TVET lecturers who did not have the skills to operate machines. The use of machines and equipment was a prerequisite because most processes depended on the use of machines. Through WIL, TVET lecturers indicated that they received assistance from industry personnel in using these different machines. Lecturers went on a short training programme to learn the machine operations through an induction process. It implies that the lack of skills led to delays in mastering the essential skills by students due to lecturers working on trial and error on machines. Trial and error could also lead to machine breakdown, causing unplanned maintenance and reducing machine lifespan. Overall, the programme cost may increase due to emergency maintenance on machines and the loss of time caused by machine downtime.

This study corroborates the findings of Donkor, Nsoh and Mitchual (2009), who showed evidence that TVET lecturers acquired new manipulative practical skills, new technologies, machine and interpersonal skills during industrial attachment. The research findings of this study support the study by (Donkor, Nsoh and Mitchual 2009); Ismail, Nopiah and Rasul (2018), who indicate a unique opportunity to use specialised equipment and machinery not available in their workshops at the TVET colleges. This study concurs with the findings of Donkor, Nsoh and Mitchual (2009) and (Donkor, Nsoh and Mitchual 2009); Ismail, Nopiah and Rasul (2018) on how to mitigate the lack of technical skills among lecturers in operating machines and equipment.

9.4.2 Promotion of WIL and self-initiated learning through induction processes

There was a consensus that the nature of lecturer learning included self-initiated learning, where lecturers observed how to operate machines before they could use them. This happened during the initial part of the training when the industry was involved. There was evidence that lecturers lacked industry experience that initiated this intervention in workplace training before using machines to minimise accidents. The training was necessary to ensure that the basic operation procedures were mastered. Due to the lack of basic operation procedures, Van der Bijl and Taylor (2016) highlighted that companies required more time to gain trust and test lecturer competencies before permitting them to work independently.

This study is in line with the findings of Govender and Wait (2017), showing that lecturers who are involved and experience WIL had significant benefits because induction provided clear, helpful, supportive and professional theory-practical linkages. This study further supports (Govender and Wait 2017), who found that WIL benefits through induction, where lecturers were introduced to the equipment, working teams, and allocated tasks and responsibilities. Moreover, this study supports the finding by Clayton (2013) that shows that workplace training was supported by mentoring lecturers on what they did not know from appropriately experienced industry personnel. This current study supports the findings by Govender and Wait (2017) and Clayton (2013) that industry induction processes promote WIL and self-initiated learning in the TVET sector.

9.4.3 TVET lecturers gained technical know-how about industrial processes

There were many industry processes highlighted during WIL. Lecturers were involved in WIL to bridge the theory-practice gap. Lack of knowledge about industry processes implied that students could finish their courses without acquiring trade prerequisites because the lecturer lacked the knowledge to relate theory to practical processes. Findings from this study concur with Blom (2019), who acknowledges that vocational lecturers' lack of appropriate practical knowledge leads to vocational education practical training. From that viewpoint, the findings of this study support the South African Democratic Teachers' Union (2011)'s study that TVET lecturers lacked the knowledge, trade qualifications or industry credentials to teach TVET students. However, in Malaysia, Khuzainey *et al.* (2020) discovered that vocational teachers could work on a maintenance schedule and applied various installation techniques. This could be attributed to the fact that the country is in a better state developmentally.

Contrary to that view, in South Africa, Blom (2016b) posits that vocational teachers lack the right mix of skills to balance industry experience and pedagogical skills. Therefore, more

TVET lecturers need to be developed through industry exposure to ensure they possess the needed industry skills. Therefore, through WIL, TVET lecturers who participated in the training gained technical know-how about industrial processes. This finding supports the Swiss-South African Cooperation Initiative (2016a) on lecturer WIL which showed that most industrial processes learnt during WIL were highly skilled and required considerable resources to accomplish.

9.4.4 Lack of knowledge about safe working procedures

In industry, safety issues are controlled through housekeeping and following safety procedures. The safety issues regarded behaviour, workplace hazards and PPE. It appeared that TVET lecturers did not have industry safety knowledge since they lacked industry exposure. The findings of this study confirm what Van der Bijl and Taylor (2018) established that safety procedures were somehow neglected before the job could be done. The lack of knowledge about safety procedures negatively affects company processes when there is a fatality. A fatality may lead to loss of life, equipment and income. It further affects future engagements at the host employer, affecting the economy at large.

Safety issues were generally regarded as essential to lecturer learning during WIL. To mitigate the challenge, safety sessions were organised to conscientise lecturers about the safety procedures and work hazards to avoid incidents and fatalities during work operations. Moreover, Kaskutas *et al.* (2016) indicate that safety talks improve communication, empower workers, reduce injuries, and improve workplace safety procedures. Othman, Shafiq and Nuruddin (2017) acknowledge that safety training and awareness were vital in reducing industry accidents. Olson *et al.* (2016) disclose many fatalities in the construction industry due to negligence, falling from heights, equipment failure and structural collapse. Thus, the TVET lecturers learnt from identifying workplace hazards and unsafe acts, preventing human error and negligence, and safe working procedures during WIL.

9.4.5 Lack of interpersonal skills

The interpersonal skills constitute the intangible and non-technical skills that TVET lecturers experienced during WIL. Lecturers lacked soft skills and were initiated into an array of these skills during WIL. Findings from the current study align with Cline (2005), who reports on soft skills and submitting that employers value computer skills to succeed in their operations. Therefore, the lack of computer skills impeded TVET lecturers from working on AutoCAD and MS Project. It implies that lecturers took a long time to learn other computer software because they lacked a key learning skill. Mesuwini, Singh-Pillay and Bomani (2020) emphasise the impartation of technical and soft skills required by industry. By the same token, soft skills complement technical skills requirements of a job (Ellis, Kisling and Hackworth 2014).

Findings broadly support Bukit (2012), who notes that TVET teachers learnt from colleagues, built relationships with colleagues, and acquired communication skills, listening skills, supervisory and managerial skills through practice and observation. It seems that the lack of interpersonal skills could have created a barrier between lecturers and industry personnel, as they could not express themselves explicitly. They could also miss crucial instructions or fail to negotiate their way. Payne (2018) and Ellis, Kisling and Hackworth (2014) identified soft skills as vital facets in executing workplace processes. Hence, TVET lecturers had an opportunity to learn to communicate with other tradespeople in their line of duty. Martin and Rees (2018) emphasise that WIL placement built networks, interpersonal relations, negotiation skills and contacts.

9.4.6 Creativity and cost-saving skills among civil engineering TVET lecturers

Since lecturers lacked industry placement experience, it appeared that they could not think out of the box. Exposure to industry suggested the ability to show creativity skills and flexibility in improvising on available materials. It can be deduced that due to a lack of creativity, there could be a loss of material that could be put to good use through recycling. In so doing, the TVET colleges could save costs and pass on the skill to students. Through such creativity, the cost of training could reduce and make training affordable for many.

Implicit in the findings of this study, Dondofema, Mwenje and Musemwa (2020) show conformity that industry placement develops creativity and work initiative to make suggestions for job improvements. Furthermore, the findings are in line with the literature by Cheong *et al.* (2014), who posit WIL as very broad, incorporating many areas not covered in the textbooks. Moreover, they acknowledge that learning takes place beyond the confines of the classroom, where an opportunity is availed for first-hand experience in the daily operations of an organisation (Cheong *et al.* 2014). This study aligns with a study conducted by Subbiah *et al.* (2017), who indicate that students gained creativity skills during industrial training. Therefore, WIL could provide opportunities to develop a range of solutions using creative thinking and cost-cutting skills (Jackson 2013, 2018).

9.4.7 Lack of problem-solving skills

Engineering industries focus on production using machinery and equipment. The machinery needs repair and maintenance from time to time. However, lecturers were found to lack the skill due to a lack of industry exposure. The lack thereof implies that lecturers could not repair their workshop machinery in the event of a breakdown. Problem-solving provides an opportunity to think through situations and apply technical know-how to implement solutions.

The finding from this current study confirms a study by Fjellström (2014), which highlights the students' engagement in problem-solving tasks to find solutions to emerging problems. Another study by Subbiah *et al.* (2017) shows that industry training provides an opportunity to learn problem-solving and critical thinking skills. Furthermore, a study by Renganathan, Karim and Li (2012) provided evidence that students executed problem-solving activities during their industrial internship programme. Therefore, TVET lecturers learnt hands-on, new practical learning experiences during WIL to improve problem-solving skills.

9.4.8 Evidence of the use of work schedules

During WIL, lecturers used work schedules. These were work guidelines and reference points, which provided relevant instructions for a task. Findings emanating from the current study were consistent with Spiker, Walls and Campbell (1992), who reflect a job card as a user instructional support that provides short phrases and detailed graphics to describe the performance of a particular task. In other words, it provides a guideline to work. Since lecturers lacked industry exposure, they equally lacked understanding of how to plan practical tasks correctly. It appears that the lack of knowledge of a proper work schedule leads to inappropriate methods of operation. These operations may take more time, more material or fail to yield the intended results. There may be a loss of time or wastage of material in the process. Patel, Prabhu and Drury (1992) showed that users found the job card as a very useful information source. Furthermore, Lu *et al.* (2019) show evidence that job cards directly support maintenance operations, offer detailed information and procedures, and allow careful and safe completion of the assigned tasks. In this regard, the current study supports the finding by Lu *et al.* (2019) that a job card was important as it guided how to complete tasks.

9.4.9 Training helped in the formation of industry connections

Since TVET lecturers lacked industry experience, in the same way, they did not have any industry links. Failure to have industry connections could imply a lack of connection with the world of industry. TVET students learn towards industry engagement. As such, they need to get industry links to know they get the current industry trends. The lack of industry links keeps the TVET sector in the dark, yet students must be prepared for the industry. It probably leads to prepare students for dated skills that industries do not value. This study aligns with Jahonga, Canute and Murey (2016), who reiterate that poor linkages between the industry and TVET lecturers lead to skills mismatch and underdevelopment.

This study further affirms Mabhanda (2017), who found that synergy between TVET lecturers, institutions, and industry would greatly stimulate and enhance a partnership and lecturer's effectiveness. Bergami and Schuller (2009) explain industry connections as the placement experience providing real opportunities for developing strong industry networks with colleagues in the host firm. If these networks are nurtured and maintained, they have the potential to be a powerful resource in the classroom teaching and learning environment. Moreover, this study supports the findings of Bergami, Schuller and Cheok (2011) that the lecturer on WIL has an opportunity to develop continuing relations with the host company during and after the industry placement experience.

9.4.10 Participants suggest colleagues to participate in WIL host industries

Lecturers' experiences during WIL generally highlighted their viewpoints regarding recommendations to others to engage at the same companies. Positive recommendations reflected that lecturers benefited from WIL. When they engage in industry and gain skills, it implies that lecturers get adequate exposure to teaching relevant industry skills to students. This current study endorses the findings of Duncan (2017: 10), who confirms that:

> "Exposure to industrial workplace develops, motivates and energises TVET lecturers. They learn a lot about current technology, industrial systems and processes".

Concomitant to this, Alias, Sofyan and Triyono (2020) express: *“Vocational teachers received the latest industry insights during their practical experience”*. Receiving the latest industry insights reveals that there were benefits associated with industry practice. Again, Duncan (2017: 68) acknowledges that:

> "Workplace exposure for teaching staff at TVET institutions helps to bring the classroom curriculum into closer alignment with the skills needs of industry and motivates lecturers".

Duncan agrees that industry exposure played a key role in closing the gap between theory in the classroom and industry practice. The current study supports the findings of Ngwane (2016); Subbiah *et al.* (2017), who state that participants conceived WIL as offering industrial experience and skills for the world of work and hence, recommended them to engage in WIL at the same host employers.

9.4.11 Lack of lecturer WIL support

A lack of support during WIL negatively affected the TVET lecturer. WIL aimed at equipping lecturers with industry-specific skills. Failure to get support implied that the TVET lecturer probably missed crucial practical skills due to challenges caused by the host industry personnel. Lack of WIL support could mean that students may receive inadequate skills as ripple effects of lecturer challenges during WIL.

This study aligns with the findings of Smith (2017), which states that: "They could not believe I was coming for practical skills. They thought, maybe, I was coming to take their jobs. They were quite reluctant to show me things”. Implicit in the findings noted immediately, Tshewang (2021) shows conformity that company technicians and supervisors were suspicious of the knowledge and skills of lecturers and made them do irrelevant work in their field of study or work on menial jobs without doing the essentials of the job. The above findings are explained by findings from a study by (Sewell, Venter and Mason 2015), who report that almost half of the host companies surveyed were not familiar with the concept of WIL. It may explain why some industry personnel were hostile to TVET lecturers during WIL. To this end, Blom (2015) recommended an urgent need for a clearly defined national WIL policy and placement modalities.

9.5 RECOMMENDATIONS BASED ON KEY FINDINGS

9.5.1 Recommendation 1

TVET lecturers should be equipped with technical skills to operate different machines, equipment and carry out processes and procedures. Duncan (2017) and Mabhanda (2017) confirm that industrial attachment enhances TVET lecturer skills, and they feel empowered by the industry experience and usually want to experience more. Smith and Yasukawa (2017) add that a deep understanding of the subject matter is important, where lecturers must demystify and simplify jargon and bring industry experiences to the classroom.

9.5.2 Recommendation 2

TVET lecturers should have a positive attitude towards their learning during WIL. Since they go to industry without sufficient skills, they need to take a leading step in opening up for knowledge so that industry personnel are encouraged to offer a helping hand. Clayton (2013) highlighted that workplace training was achieved by mentoring lecturers on what they did not know from appropriately experienced industry personnel.

9.5.3 Recommendation 3

There are many processes carried out in industry, each process having its specific requirements. Therefore, lecturers need to engage in well-equipped industries to learn different processes pertaining to their particular discipline. Blom (2016b) supports that vocational teachers who have not engaged in WIL lack the right mix of skills to balance industry experience and pedagogical skills. Furthermore, Zulkifli *et al.* (2018) demonstrate that vocational teachers gained a rich understanding of industry activities and other major concepts. Overall, lecturer engagement in practical training empowers the practitioner in explaining abstract concepts, relating theory to practice, and gaining essential confidence.

9.5.4 Recommendation 4

Following health and safety procedures protects all workers on site. It is everyone's responsibility to follow safety protocols without compromise. Failure to comply can be catastrophic. Savitha and Malathi (2018) express that many accidents occur in industrial areas and cause major damage to humans and properties. Further, Hiyassat, Hiyari and Sweis (2016) highlighted that poor housekeeping wastes time, energy and causes injuries and huge losses if safety procedures are not correctly followed.

9.5.5 Recommendation 5

Interpersonal skills include communication, teamwork, and many other soft skills. Success is imminent when interpersonal skills are at play. Lecturers need to engage in speaking their minds, negotiating, and effectively communicating content-related matters. Ellis, Kisling and Hackworth (2014) agree that collaboration is achieved using interpersonal skills, teamwork and communication skills to liaise with colleagues at a workplace.

9.5.6 Recommendation 6

TVET lecturers should possess creativity and cost-saving skills in materials and designs. Karunaratne and Perera (2019) and Omar, Zahar and Rashid (2020) confirm that industry placement enhances creativity skills. Creativity skills enable improvisation with resources at hand. It means a lecturer cannot fail to perform a task in a workshop due to a lack of specific tools but could improvise from those available to ensure the successful completion of a task.

9.5.7 Recommendation 7

Problem-solving is fundamental to the survival of any organisation. Lecturers need this skill to manage teaching and learning. Nogueira and Moreira (2012) and Jackson (2018) highlight the importance of problem-solving skills to rationally and logically deduce appropriate and well-thought solutions and conclusions.

9.5.8 Recommendation 8

A proper work plan guides operations timeously, outlining steps and procedures for executing tasks and preventing any miscommunication. Lack of a work schedule causes work overload on others. Karunaratne and Perera (2019) shows that successful work is facilitated by a well-structured schedule covering all the areas.

9.5.9 Recommendation 9

TVET lecturers must have industry connections that provide up to date information on current industry trends. The links give a better understanding of industry needs, strengths and shortfalls of the TVET sector (Duncan 2017). Kintu, Kitainge and Ferej (2019) acknowledge that close industry links could help solicit support from the industry through equipment and tools donations. Malale and Sentsho (2014) posit that networking develops by knowing other people.

9.5.10 Recommendation 10

TVET lecturers should engage in WIL to learn industry skills relevant to their trade subjects. Lecturers who teach in TVET need to be competent in the theory and practical aspects of their disciplines. “A strong workplace component must be built into lecturer qualifications so that they can prepare students according to workplace demands” (Nduna 2016: 286).

9.5.11 Recommendation 11

Lecturers on WIL need support from all role-players, so that adaptation to the workplace environment is easy. WIL officers and industry personnel need to understand the purpose of the lecturer in industry to offer the necessary support. However, Uen *et al.* (2018) acknowledge that the industry supervisor guided tasks and supported TVET lecturer learning through the mentoring process. WIL aimed at equipping lecturers with industry-specific skills. Failure to get support implied that the TVET lecturer probably missed crucial practical skills due to challenges at the host employer or did not learn at all. As a result, the lack of WIL support could mean that students may receive inadequate skills because of lecturer challenges during WIL. A study by Ahmad (2020) states that proper, continuous, and follow-up supervision support is vital in achieving desired goals.

9.6 CONTRIBUTION OF THE STUDY

This study explored TVET lecturers learning through WIL, particularly the nature of their learning, what they learn, and how the lecturers understand their learning. Findings confirmed that TVET lecturers indeed gained practical skills from learning during WIL. The literature highlighted that many TVET lecturers did not have the industry experience to prepare students adequately for industry (Amedorme and Fiagbe 2013). The current TVET lecturer cadre lacks the right mix of skills and industry experience, which determines the quality of TVET graduates (Blom 2016b; Buthelezi 2018). The study established that TVET lecturers gained different industry skills through WIL. Reviewed literature confirms that learning from experience is the best and invaluable experience gained (Ahmad and Rashid 2011). Therefore, lecturers learnt a variety of relevant skills in their respective trades. Moreover, lecturers also appreciated the importance of industry attachment, which helped them keep abreast with industry currency and technology.

I realised that Kolb's theory could not be used alone in addressing lecturer learning through WIL. Hence, I incorporated Bergami and Schuller's model in my study to understand TVET lecturers' industry placement skills and industry placement experience.

While a few literature sources are available on TVET lecturers learning through WIL in industry, this particular study reduces this gap. It adds literature to the body of knowledge. Strategies to improve WIL are also a major contribution to the literature from this study. The combination of Kolb's theory and the conceptual framework helped to understand TVET lecturer learning.

This study will inform DHET, SSACI and SETAs through the findings and recommendations that may inform discussions and policy decisions on this initiative and, consequently, the inception of other beneficial programmes for TVET lecturers to benefit the TVET sector as a whole.

While the global world indicated an abundance of relevant host companies compared to sub-Saharan Africa, there was evidence from the literature that TVET lecturers were not given time off to go on WIL. In the African context, TVET lecturers spent some time in industry to gain

9.7 A PROPOSED MODEL FOR TVET LECTURER WIL

The proposed model serves to guide TVET lecturer learning in industry during WIL. The model has five stages that a TVET lecturer without industry experience goes through. The selection process ensures that the correct prospective candidates are chosen. The training centre provides a resemblance of industry-specific skills. Therefore lecturers get a correct feel of what to meet in industry. Induction involves familiarising TVET lecturers with site-specific health and safety matters that could impede the progress and productivity during work operations. Ganah and John (2017: 344) summarise induction as: "the first point of contact both for site personnel and others who have to come on-site". This applies to lecturers who attend industry WIL for the first time. After a successful induction process, WIL exposure ensues, followed by writing a trade test to qualify as an artisan.

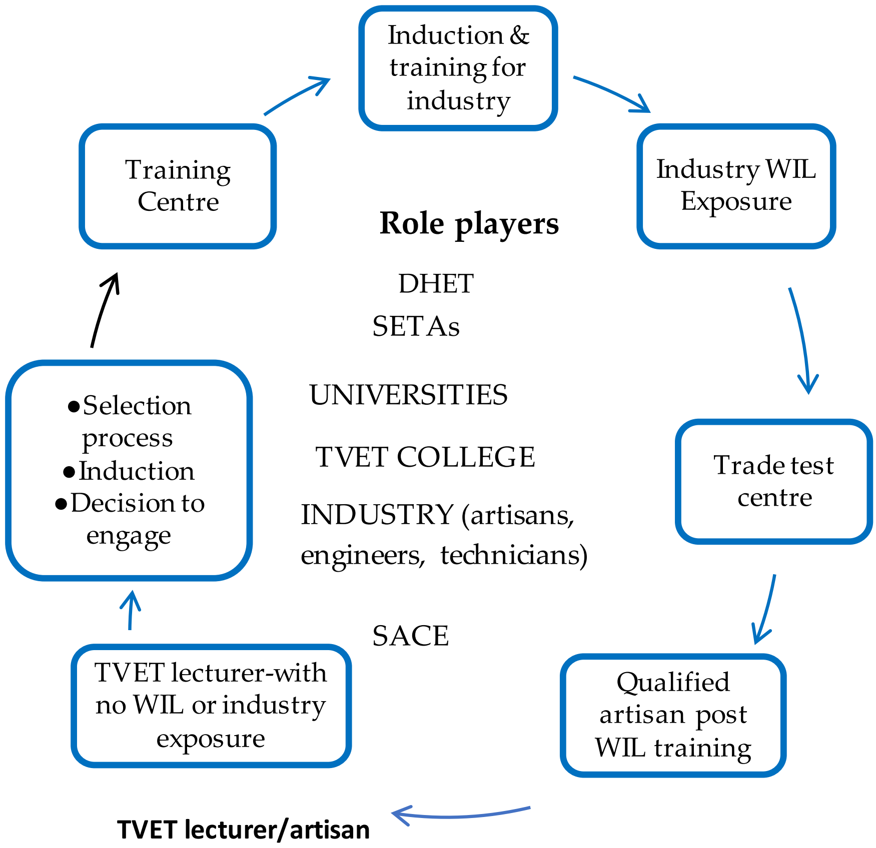

Figure 14: A proposed model for TVET lecturer WIL

Source: Designed by the author from the research data and experience.

Notes: The proposed model has role players at its core, with the government represented by DHET, TVET Colleges and SETA, while the private sector is represented by industry.

This model is appropriate for the WIL implementation of TVET lecturers in industry. It was derived from the current study's findings. The discussion of its structure comes in three themes: the structure of the model, WIL process, role players, and challenges and benefits. These are discussed below.

9.7.1 Structure of the model

The process starts from the TVET lecturer without WIL experience. A lecturer is selected for WIL based on a set of transparent criteria as agreed by the college. The desire to attend is paramount so that only willing participants are engaged to avoid unnecessary setbacks along the process. The training centre serves as a shadow industry where WIL aspirants test the journey ahead. The induction process follows with industry excursions to feel the industry environment. Once induction is complete and the contract to engage signed, a full training process ensues with an 80% inclination towards an industry where the lecturer reports to industry personnel on work matters. This study identified issues with time where lecturers kept college times while in industry. In the proposed model, 80% entails the lecturer reports to industry and follows host employer duty roaster. Qualified industry personnel are identified and responsible for training and directly link with the college WIL officer.

9.7.2 Role players

Role players have a duty to enforce attendance, punctuality, adherence to the programme structure and roaster. These are WIL officer, artisan, supervisor, training manager/officer, semi-skilled and unskilled labour and the lecturer. Having noted that lecturers did not receive fair treatment because they were suspected of eyeing jobs for industry personnel, the induction process serves as a session to make introductions, meet and greet and explain the purpose of engagement.

9.7.3 Challenges and benefits

Some of the issues are interlinked and have been highlighted above. The main challenge lies in the daily time of engagement. Sticking to college times should be overridden to make sure that proper training is delivered. Benefits of the model include transparency of the process where one is aware of the purpose of engagement, times of engagement, role players, and personal drive and initiative. Jackson (2013) suggests that an induction course before engaging in WIL improves workplace experiences. Agwa-Ejon and Pradhan (2017) agree that engagement in a well-organised induction course before WIL placement simplifies the experience and makes it effective. It is, therefore, necessary to have a thorough induction where willing parties are engaged. Funders like DHET and SETAs are keen to see value for money. Hence, ensuring that the right people are engaged is the main purpose of the model.

9.7.4 Model summary

The model for TVET lecturer WIL was displayed and discussed in the figure immediately above. The structure, role players, challenges and benefits were explained. The benefits of the model were discussed.

9.8 RECOMMENDATIONS FOR FURTHER STUDY

This current research focused on TVET lecturer learning during WIL in KwaZulu-Natal province, South Africa. The following recommendations are proffered for further research:

1. Conduct large scale research on all South African TVET College lecturers to understand what they learn and understand during WIL.
2. Involve other disciplines besides civil, electrical and mechanical trades to assess trends in the outcomes.
3. Explore how industry personnel profiles exert an impact on TVET lecturers learning in the industry.

9.9 CONCLUSION

The study sought to explore TVET lecturer learning during WIL to establish the nature of their learning, the kinds of knowledge they gained, and how they understood their learning. Findings acknowledged the lack of technical skills in operating civil, electrical and mechanical engineering machines and equipment in the industry. It was apparent that TVET lecturers who did not have the skills to operate machines had a challenge on their first encounters in the industry.

There were several findings that reflect on positive impact of the training programme, namely, TVET lecturers who participated in the training gained knowledge about industrial processes; improved knowledge and practice of safe working procedures; the lack of interpersonal skills in the TVET industry was addressed; there was creativity and cost-saving skills among civil engineering TVET lecturers; WIL offered problem-solving skills to TVET lecturers; evidence of the use of work schedules; and training helped in the formation of industry connections. The research findings further identified the challenges that still persist in TVET colleges namely, a lack of technical skills among lecturers who did not receive training in using civil, electrical and mechanical engineering machines and equipment in industry. It was further confirmed that the industry induction processes promoted WIL and self-initiated learning in the TVET sector that was able to help a limited number of lecturers; and a lack of lecturer WIL support. The study recommends adequately capacitating TVET lecturers with technical and soft skills to ensure their ability to comprehend the use of advanced machinery. The lecturers on WIL need constant support to check the relevance of practical skills received during WIL. To ensure proper training, the study recommends a training model for TVET lecturer WIL as developed and appraised in this study. A large scale research could be conducted on all South African TVET college lecturers to understand what they learn and understand during WIL.

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ANNEXURES

Annexure 1: Request for granting of an ethical clearance by DUT ethical committee

The Ethical Committee

Durban University of Technology

Department of Higher Education and Training

19 Wigford Road, Manson Hills

Pietermaritzburg

3200

25 April 2018

RE: Request for Permission to Conduct Research

Dear Sir/Madam,

My name is Joseph Mesuwini, a Doctoral student at the Durban University of Technology. I am employed at Majuba TVET College as an Engineering lecturer. I am interested in understanding what lecturers are learning through WIL. My research topic is Technical and Vocational Education and Training lecturers' learning through Work Integrated Learning: A case of three Colleges in KwaZulu-Natal Province. I intend to do face-to-face interviews with your lecturers and industry personnel on work-integrated learning and audio-recorded interviews. I will also do non-participant observations of lecturers. The findings will be availed to all participants. Attached is the information letter giving details of my research procedure. The recommendations from this study may influence DHET to develop more programmes on TVET lecturer development.

I am requesting your permission to grant an ethical clearance letter to conduct research within the TVET Colleges, focusing on lecturers on the Work Integrated Learning programme.

I can be contacted on 0788891193, fax 0343181232 and email address jmesuwini@yahoo.co.uk

For more information, you may contact my supervisors below:

Dr. KL Thaba-Nkadimene: 0716053083; Email: KgomotlokoaT@dut.ac.za
Dr D. Mzindle: 0824357628, Email: Dudun@dut.ac.za
Durban University of Technology
School of Education
Faculty of Arts and Design
Indumiso Midlands Campus,
Pietermaritzburg, 3200

I look forward to hearing from you soon.

Yours faithfully

Joseph Mesuwini

Annexure 2: The Ethical clearance

DUT
DURBAN
UNIVERSITY OF
TECHNOLOGY

Institutional Research Ethics Committee
Research and Postgraduate Support Directorate
2nd Floor, Berwyn Court
Gate 1, Steve Biko Campus
Durban University of Technology

P O Box 1334, Durban, South Africa, 4001

Tel: 031 373 2375
Email: lavishad@dut.ac.za
http://www.dut.ac.za/research/institutional_research_ethics

www.dut.ac.za

11 April 2019

Mr J Mesuwini
P.O. Box 3003
Newcastle
2940

Dear Mr Mesuwini

Technical Vocational Education and Training lecturers' learning through Work Integrated Learning: A study of three Colleges in KwaZulu-Natal Province

The Institutional Research Ethics Committee acknowledges receipt of your final data collection tool for review.

We are pleased to inform you that the data collection tool has been approved. Kindly ensure that participants used for the pilot study are not part of the main study.

In addition, the IREC acknowledges receipt of your gatekeeper permission letter.

Please note that FULL APPROVAL is granted to your research proposal. You may proceed with data collection.

Any adverse events [serious or minor] which occur in connection with this study and/or which may alter its ethical consideration must be reported to the IREC according to the IREC Standard Operating Procedures (SOP's).

Please note that any deviations from the approved proposal require the approval of the IREC as outlined in the IREC SOP's.

Yours Sincerely,

Professor J K Adam
Chairperson: IREC

2019 -04- 11

INSTITUTIONAL RESEARCH ETHICS COMMITTEE

Annexure 3: Request for permission to conduct research – DHET Regional Office

The Human Resources Department
Department of Higher Education and Training
19 Wigford Road, Manson Hills
Pietermaritzburg
3200

25 April 2018

RE: Request for Permission to Conduct Research

Dear Sir/Madam,

My name is Joseph Mesuwini, a Doctoral student at the Durban University of Technology. I am employed at Majuba TVET College as an Engineering lecturer. I am interested in understanding what lecturers are learning through WIL. My research topic is Technical and Vocational Education and Training lecturers' learning through Work Integrated Learning: A case of three Colleges in KwaZulu-Natal Province. I intend to do face-to-face interviews with your lecturers and industry personnel on work-integrated learning and audio-recorded interviews. I will also do non-participant observations of lecturers. The findings will be availed to all participants. Attached is the information letter giving details of my research procedure. The recommendations from this study may influence DHET to develop more programmes on TVET lecturer development.

I am seeking your permission to conduct research within your Colleges, focusing on lecturers on the Work Integrated Learning programme.

I can be contacted on 0788891193, fax 0343181232 and email address
jmesuwini@yahoo.co.uk

For more information, you may contact my supervisors below:

Dr. KL Thaba-Nkadimene: 0716053083; Email: KgomotlokoaT@dut.ac.za
Dr D. Mzindle: 0824357628, Email: Dudun@dut.ac.za
Durban University of Technology
School of Education
Faculty of Arts and Design
Indumiso Midlands Campus,
Pietermaritzburg, 3200

I look forward to hearing from you soon.

Yours faithfully

Joseph Mesuwini

Annexure 4: Permission from DHET to Conduct Research

higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

KWAZULU-NATAL PROVINCIAL GOVERNMENT

Enquiries: Ms ML Moetsela **033 342 1964** **47 Prince Alfred Street Pietermaritzburg**
Moetsela.L@dhet.gov.za

Letter of consent

28 March 2019

RE: Permission to conduct Research in TVET Colleges

To Whom it may concern

Please receive this communication as a formal consent letter for Mr Joseph Mesuwini a Lecturer at Majuba TVET College and student at the Durban University of Technology; to conduct his research titled "*Technical Vocational Education and Training lecturers' learning through Work Integrated Learning: A study of three Colleges in KwaZulu-Natal Province*".

As the Acting Regional Manager for DHET Region, I grant Mr Mesuwini permission to conduct his research in our respective TVET colleges.

Regards

Sipho J. Nzimande (Ph.D)

Acting Regional Manager
DHET: KZN Region

Annexure 5: Request for Permission to Conduct Research with Employer

The Human Resources Department
ArcelorMittal Newcastle Works
Iscor Road
Newcastle
2940

25 April 2018

RE: Request for Permission to Conduct Research

Dear Sir/Madam,

My name is Joseph Mesuwini, a Doctoral student at the Durban University of Technology. I am employed at Majuba TVET College as an Engineering lecturer. I am interested in understanding what lecturers are learning through WIL. My research topic is Technical and Vocational Education and Training lecturers' learning through Work Integrated Learning: A case of three Colleges in KwaZulu-Natal Province. I intend to do face-to-face interviews with your training personnel on work-integrated learning, which will be audio recorded. I will also do non-participant observations of lecturers and industry personnel. The findings will be availed to all participants. Attached is the information letter giving details of my research procedure. The recommendations from this study may influence DHET to develop more programmes on TVET lecturer development.

I am seeking your permission and consent to conduct research within the company on training personnel on the Work Integrated Learning programme.

I can be contacted on 0788891193, fax 0343181232 and email address jmesuwini@yahoo.co.uk

For more information, you may contact my supervisors below:

Dr. KL Thaba-Nkadimene: 0716053083; Email: KgomotlokoaT@dut.ac.za

Dr D. Mzindle: 0824357628, Email: Dudun@dut.ac.za

Durban University of Technology

School of Education

Faculty of Arts and Design

Indumiso Midlands Campus,

Pietermaritzburg, 3200

I look forward to hearing from you soon.

Yours faithfully,

Joseph Mesuwini

Annexure 6: Request for Permission to Conduct Research at TVET College

The Rector
Majuba TVET College
Department of Higher Education and Training
P. Bag 183
Newcastle
2940

25 April 2018

RE: Request for Permission to Conduct Research

Dear Mr S. Mlotshwa,

My name is Joseph Mesuwini, a Doctoral student at the Durban University of Technology. I am employed at Majuba TVET College as an Engineering lecturer. I am interested in understanding what lecturers are learning through WIL. My research topic is Technical and Vocational Education and Training lecturers' learning through Work Integrated Learning: A case of three Colleges in KwaZulu-Natal Province. I intend to do face-to-face interviews with your lecturers and industry personnel on work-integrated learning and audio-recorded interviews. I will also do non-participant observations of lecturers. The findings will be availed to all participants. Attached is the information letter giving details of my research. The recommendations from this study may influence DHET to develop more programmes on TVET lecturer development.

I am seeking your permission and consent to conduct research within the college on lecturers who are on the Work Integrated Learning programme.

I can be contacted on 0788891193, fax 0343181232 and email address jmesuwini@yahoo.co.uk

For more information, you may contact my supervisors below:

Dr. KL Thaba-Nkadimene: 0716053083; Email: KgomotlokoaT@dut.ac.za

Dr D. Mzindle: 0824357628, Email: Dudun@dut.ac.za

Durban University of Technology

School of Education

Faculty of Arts and Design

Indumiso Midlands Campus,

Pietermaritzburg, 3200

I look forward to hearing from you soon.

Yours faithfully

Joseph Mesuwini

Annexure 7: Approval to conduct research

CENTRAL OFFICE:
Private Bag X6602
Newcastle
2940

83 Allen Street
Newcastle 2940

Tel: 034 326 4888
034 326 4596
Fax: 034 326 4855
034 326 4889

CAMPUSES

MAJUBA TECHNOLOGY CENTRE:
Tel: 034 329 1182/6
Fax: 034 329 2580

NEWCASTLE TECHNOLOGY CENTRE:
Tel: 034 318 3041
Fax: 034 318 3044

CENTRE FOR PEOPLE DEVELOPMENT:
Tel: 034 329 2004
Fax: 034 329 2538

IT AND BUSINESS CAMPUS:
Tel: 034 318 1206
Fax: 034 318 1262

DUNDEE TECHNOLOGY CENTRE:
Tel: 034 212 5132
Fax: 034 212 5739

OPEN LEARNING UNIT:
Tel: 034 314 1011/4
Fax: 034 314 1016

NEWCASTLE TRAINING CENTRE:
Tel: 034 318 2021
Fax: 034 318 1574

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

Majuba College
Technical and Vocational Education and Training
reaching greater heights together

ENQUIRIES: Mrs ZB Nkabinde TEL: 034 326 4888 DATE: 18.03.2019

TO: Mr Joseph Mesuwini

RE: APPROVAL TO CONDUCT RESEARCH

The following research topic refers:

Technical and Vocational Education and Training lecturers' learning through work integrated learning: A study of three colleges in KwaZulu-Natal province.

You are hereby granted permission to conduct research on college **LECTURERS.** You can contact the relevant departments for details regarding the expected participants.

Should you have any queries please do not hesitate to contact us.

All the best in your studies.

Yours sincerely,

18/03/2019
Date

reaching greater heights together

Annexure 8: Approval to conduct research

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

Elangeni College
Technical and Vocational Education and Training

An ISO 9001 and OSHAS 18001 certified organisation.

09 May 2019

Dear Mr J. Mesuwini

Re Request for using the College as a site of research

Elangeni College has no objection to you using our college as a site of research: TVET lecturers' learning through work integrated learning: A study of three colleges in KZN.

However, the following conditions for external research apply:

- The name(s) of staff employed by the college cannot be used in any document.
- The name(s) of college students cannot be used in any document.
- When you need to collect data, please follow proper processes of making appointments with the relevant employees adhering to protocols.
- Once you have decided which college sites you will interested in using, please send that information to the Principal's office, so the relevant Campus Manager(s) can be informed.
- Ensure that the request for data/appointment is sent well in advance.
- Your research cannot disturb teaching and learning or any crucial functions.

Please note that failure to comply with all of the above conditions will result in the necessary legal action taken against you.

The college would like to read the final document.

Yours sincerely

TJ Aryetey (Ms)

College Principal

SABS ISO 9001 **Central Office.** 15 Portsmouth Road, Pinetown, 3610 **Postal Address.** Private Bag X9032, Pinetown, 3600 SABS OHSAS 18001

Email. info.elangeni@elangeni.edu.za **Phone.** 031 716 6700 **Fax.** 031 716 6777

INANDA	KWADABEKA	KWAMASHU	MPUMALANGA	NDWEDWE	NTUZUMA	PINETOWN	QADI
131 of Street 108812	140 Khululeka Road	F 5 Malandela Road	280 Shezi Main Road	P100 Main Road	G 384 Ithendele Drive	38 Bamboo Lane	Zulu Reserve Road
Inanda	Clermont	KwaMashu	Mpumalanga	Ndwedwe	Ntuzuma	Pinetown	Botha's Hill
Tel: 031 519 0933	Tel: 031 711 0313	Tel: 031 503 9708	Tel: 031 771 0148/2568	Tel: 074 582 9178	Tel: 031 509 1924	Tel: 031 702 3260	Tel: 031 777 1742

Annexure 9: Approval to conduct research

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

Thekwini TVET College
Opening doors to your future!

Enquiries: PA to the Principal	*Telephone: 031 250 8400*	*Date: 07-05-2019*
Imibuzo: Ms N Dlamini	*Fax Number: 031 250 8404*	*Usuku:*
Navrae:	*Address:*	*Datum:*

Mr J Mesuwini

Dear Sir,

RE: REQUEST FOR USING COLLEGE AS SITE OF RESEARCH

Thekwini TVET College has no objection to you using our College as a site of research on the **TVET lecturers 'learning through work Intergrated learning.**

However, the following conditions for external research apply:

- The College will have right to approve content with regard to research instruments and research analysis.
  - The relevant documents must be forwarded to the College Principal and approval of usage will be given by the College Principal in writing.
- The name of the College or any of its sites cannot be used in any documents
- The name/s of staff employed by the college cannot be used.
- The use of any findings that reflect negatively on the College, its partners or any related body must be approved in writing by the College Principal.

Please note that the failure to comply with all of the above conditions will result in the necessary legal action against you.

Your cooperation in this regard will be highly appreciated.

Mr. NE Mchunu

College Principal

I have read the content of this letter and I accept the conditions

J. Mesuwini		09/05/2019
NAME	SIGNATURE	DATE

Annexure 10: Letter of Information to Participants

Letter of Information to Participants

Title of the Research study: Technical and Vocational Education and Training lecturers' learning through Work Integrated Learning: A case of three Colleges in KwaZulu-Natal Province.

Principal Investigators/ researcher: Joseph Mesuwini

Co-Investigator/s/supervisors: Prof. T.G. Mukeredzi; Prof S. Mago

Brief Introduction and Purpose of the Study

TVET lecturers are employed without industry exposure and experience, yet they teach vocational subjects, training students for the world of work. Hence, they are going on work-integrated learning (WIL) to acquire the requisite practical experience and learning. This study aims to explore the nature of learning and the kinds of knowledge that Technical and Vocational Education and Training (TVET) lecturers learn through the WIL programme. The study will be conducted in KwaZulu-Natal province. Through exploring the nature and kinds of knowledge gained through WIL, the study will highlight the benefits of lecturer practical experience, thereby contributing knowledge to the larger body of TVET research and knowledge. Recommendations from the study may be adopted in TVET policies on future lecturer development.

Outline of the procedure

I will request ethical clearance by submitting my proposal to the Durban University of Technology. I will also seek permission to conduct research from the Department of Higher Education and Training (DHET) and the three TVET college principals. I will visit industries, furnish them with the information letter, and seek their permission to conduct research. Lastly, I will give the participants information letters and seek their consent to participate in interviews and observations. Those prospective participants will sign the consent form confirming their willingness to take part. Data will be generated through face-to-face interviews and observations. I will approach participants and inform them about myself and my study, confidentiality and anonymity of the information that they provide.

Risks and Discomforts to the Participant

However, there is no risk involved in this research. I will be considerate to the participant by agreeing on setting convenient dates and avoiding keeping the participants in discomfort. I will also avoid unnecessary extensions that may disadvantage the participants. Participation is voluntary, and there is no remuneration paid except for reimbursement of travel costs incurred and snacks that will be served during interviews and observations. There will be no discomfort to participants, as I will treat them with humility and respect.

Benefits to the participants and the researcher

- This study will contribute to knowledge; improve my academic and professional understanding.
- The research will lead to the development of some journal articles for publication.
- DHET will benefit from the findings and recommendations that may benefit the TVET college system as a whole.

Reasons why participants may be withdrawn from the study

A participant can withdraw from the research study at any time since their participation is voluntary. The consent letter will clearly explain that, and participants do not have to give reasons for their withdrawal but just to notify. If the participant leaves the WIL attachment for a new job, they will withdraw from the research.

Remuneration

There is no remuneration paid to participants, but participants will be reimbursed for any travel costs incurred in the research.

Costs of the study

The study is estimated to cost about R15 000.

Confidentiality

Confidentiality and anonymity of the participants' responses will be strictly maintained, and this will be stated on the consent form that the participants are well informed before confirming their willingness to participate in the research. Pseudo names will be used to conceal participants' identities.

Research-related injury

There is no anticipated injury on the participants such as physical harm, illness and pain. The participants will not be subjected to any psychological harm such as feelings of worthlessness, distress, guilt, anger or fear related, or disclosure of sensitive or embarrassing information.

Persons to contact in the event of any problems or queries.

Supervisors: Dr KL Thaba-Nkadimene: 0716053083; Email: KgomotlokoaT@dut.ac.za
Co-supervisor: Dr D. Mzindle: 0824357628, Email: Dudun@dut.ac.za

Researcher Cell: +27 78 889 1193 email: jmesuwini@yahoo.co.uk or the Institutional Research Ethics Administrator on 0313732375.

Complaints can be reported to the Director Research and Postgraduate Support, Prof S Moyo on 0313732577 or moyos@dut.ac.za

Annexure 11: Participant consent letter

CONSENT

Statement of Agreement to Participate in the Research Study:

- I hereby confirm that I have been informed by the researcher, ____ (name of researcher), about the nature, conduct, benefits and risks of this study - Research Ethics Clearance Number: ________,
- I have also received, read and understood the above-written information (Participant Letter of Information) regarding the study.
- I am aware that the results of the study, including personal details regarding my sex, age, date of birth, initials, and diagnosis, will be anonymously processed into a study report.
- In view of the research requirements, I agree that the data generated during this study can be processed in a computerised system by the researcher.
- I may, at any stage, without prejudice, withdraw my consent and participation in the study.
- I have had sufficient opportunity to ask questions and (of my own free will) declare myself prepared to participate in the study.
- I understand that significant new findings developed during this research, which may relate to my participation, will be made available to me.

_______________________ ___________ ______ _________________

Full Name of Participant Date Time Signature

I, _____ (name of researcher) herewith confirm that the above participant has been fully informed about the nature, conduct and risks of the above study.

___________________ ___________ _____________________

Full Name of Researcher Date Signature

____

Full Name of Witness (If applicable) Date Signature

Full Name of Legal Guardian (If applicable) Date Signature

Annexure 12: Interview Questions

1. What kinds of knowledge do TVET lecturers gain through WIL?
    i. Tell me what you learn in Industry during WIL?
    ii. Please share with me the tasks that do you do here.
    iii. What kinds of things do you learn?
    iv. Are there any new skills which you have learnt through WIL?
    v. Tell me what the knowledge relates to.
    vi. Tell me about using machines ... What is it like?

2. What is the nature of TVET lecturers learning through WIL?
    i. Will you please take me through your typical day at work?
    ii. Do you meet and discuss as colleagues?
    iii. Do you have meetings with supervisors?
    iv. Are these meetings helpful? If so, in what way?
    v. What do you learn from those meetings?
    vi. Are you able to work alone in doing tasks?
    vii. How did you get to know how to use machines in this company?
    viii. Did anybody assist you?
    ix. Tell me the kinds of learning/activities which take place in this company?
    x. Do you have time to look back and think about what you have done?
    xi. Do you enjoy talking about work?
    xii. Please tell me what guides you to do your daily tasks.

3. What are the conceptions of lecturers learning through WIL?
    i. Share with me your thoughts about industrial attachment?
    ii. Tell me what you feel about this environment?
    iii. Tell me about your learning experiences during WIL? …
    iv. Would you recommend your colleagues to do WIL here?
    v. What are your views about WIL?
    vi. Tell three good things that happened to you on WIL
    vii. What about the bad things that happened on WIL?
    viii. From all this, what does WIL mean to you?

Annexure 13: Observation checklist

Question	Comment
What kinds of knowledge do TVET lecturers gain through WIL?	
Type of work done, e.g., production/maintenance.	
Type of tasks done and the role played.	
Evidence of teamwork	
What is the nature of TVET lecturers learning through WIL?	
Daily routine work. Working independently with machines/tools or under strict supervision.	
Interaction with colleagues or supervisor.	
Nature of instructions from the supervisor, i.e., verbal/non-verbal/written.	
The nature of the environment and general working conditions. Conducive to work environment.	
What are the conceptions of lecturers learning through WIL?	
Punctuality	
Any notable gestures, facial expressions.	
Cooperation/teamwork	

Annexure 14: Certificate of editing

Office: 0183892451

FACULTY OF EDUCATION Cell: 0729116600

Date: 8th September, 2021

TO WHOM IT MAY CONCERN

CERTIFICATE OF EDITING

I, Muchativugwa Liberty Hove, confirm and certify that I have read and edited the entire thesis, **TECHNICAL AND VOCATIONAL EDUCATION AND TRAINING LECTURER LEARNING THROUGH WORK-INTEGRATED LEARNING: A STUDY OF THREE COLLEGES IN KWAZULU-NATAL,** submitted by **JOSEPH MESUWINI,** in fulfilment of the requirements for the degree **DOCTOR OF EDUCATION, Faculty of Arts and Design, Durban University of Technology, PIETERMARITZBURG.**

JOSEPH MESUWINI was supervised by **DR K.L. THABA-NKADIMENE** and co-supervised by **DR D. MZINDLE.**

I hold a PhD in English Language and Literature in English and am qualified to edit such a thesis for cohesion and coherence. The views expressed herein, however, remain those of the researcher/s.

Yours sincerely

Professor M.L. Hove (PhD, MA, PGDE, PGCE, BA Honours – English)