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Nature of TVET Lecturer Learning During Work Integrated Learning: A South African Perspective

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Abstract: The purpose of the study was to explore Technical Vocational Education and Training (TVET) lecturers learning through Work Integrated Learning (WIL), specifically to establish the nature of their learning and determine how the lecturers understood their learning. However, since the launch of this WIL initiative, what these lecturers learnt, and how they understand their learning has not been researched. This study sought to investigate the nature of learning of these lecturers. The study was conducted in three TVET colleges in KwaZulu-Natal (KZN) province. Kolb's experiential learning theory was used to undergird the study. The research was located in the interpretive paradigm, which used a multiple case study design. A qualitative research approach was adopted. Convenience sampling design was used to select three TVET colleges as well as industries hosting WIL lecturers. Eighteen TVET lecturers were purposively sampled from a population of lecturers in the three TVET colleges. Data were generated using semi-structured face-to-face interviews from lecturers who completed WIL and those who were on WIL during the study. The study used thematic and narrative analysis to analyse data. Findings revealed that lecturers gained practical experiences through teamwork, networking and sharing of experiences and ideas with industry personnel, diagnosis, troubleshooting, and repairing engineering components during WIL. The study recommended capacitating all TVET lecturers with practical industry skills. The findings showed that TVET lecturers did not simply go to an industry site and pick up new experiences from their practice but learnt from others. Recommendations from the study informed the discussions and policy decisions in the Department of Higher Education and Training (DHET), Swiss-South African Cooperation Initiative (SSACI) and Sector Education and Training Authority (SETA) on this WIL initiative, and may influence provision of other forms of support necessary for the TVET sector.

Keywords: Technical Vocational Education and Training (TVET), Work-Integrated Learning

1. Introduction

The South African TVET college sector has been in transition since 1996, undergoing a transformation to improve the quality of training and make the sector more responsive to current industry needs (Akoojee et al., 2008; McGrath et al., 2020; Mutereko & Wedekind, 2017). The DHET, has since 2010, focused on student numbers and expansion, ignoring the current situation in which TVET colleges find themselves, where lecturers need industry practical skills development (Akoojee, 2016; Blom, 2019). The Human Resource Development Council for South Africa (2014) cautions that colleges must grow enrolments considerably without losing sight of the quality and relevance of training. Van der Bijl (2021) says that resourcing TVET colleges encompasses providing material and human resources that are appropriately qualified to fulfil the mandate of workforce development. Qualified here implies academic and professional qualifications, which include industry experience. The TVET sector enrolments increased from approximately 350 000 to 650 000 in just three years (in the years 2010 to 2013) and were set to expand substantially further to have head-count enrolments of two and

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a half million by 2030 (Blom, 2014; Department of Higher Education and Training, 2014). In reaction to these developments, Blom (2016b) laments that these quantitative targets were worrying given the lack of corresponding high growth in the provision of TVET lecturers who were appropriately equipped with knowledge, skills, industry exposure, and experience. The student numbers suggested that many appropriately qualified TVET lecturers were needed to ensure that students were well trained. In their study, Marope et al. (2015) admit the lack of industry support for TVET lecturer industry learning exposure. Balfour et al. (2015) also add that some lecturers were not appropriately trained in their teaching areas, and many did not have industry experience. In support, Marope et al. (2015) note that TVET professionals across the globe needed WIL to get the generic practical skills, knowledge and competencies that the lecturers should possess to deliver TVET programmes.

Amedorme and Fiagbe (2013) reiterate that there were generally few TVET lecturers in Ghana. From these few, they had shortfalls in practical experience. In other words, these lecturers lacked WIL. A similar study by Van der Bijl and Taylor (2016) indicates that lecturers were involved in production under the supervision and helped rather than did individual tasks. In contrast, a study by Duncan (2017) reports that lecturers felt empowered in the experience of industry exposure and usually wanted more experiences to foster their industry relationships. To mitigate this challenge, Ghana proposed establishing a college of technology education to train the lecturers in their technical areas. Similarly, Swiss-South African Cooperation Initiative (SSACI) introduced lecturer WIL to address industrial experience for South African TVET lecturers. Donkor et al. (2009) reported that studies of lecturer industrial attachment in a TVET setting were not much reported. This study contributes to the literature on WIL.

Findings on the world trends on TVET lecturer development (Njenga, 2018) revealed that they lacked up-to-date and relevant industry experience and skills. From Malaysia, Khuzainey et al. (2020) conducted a study that focused on equipping practical knowledge and skills consisting of maintenance, inventory of machines, hand tools and works planning to vocational teachers. 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). The findings align with Alias et al. (2020), who studied an industrial internship model to improve prospective vocational teachers' skills. The findings showed evidence that vocational teachers received hands-on experience from the new equipment and technologies used in the automotive industry (Alias et al., 2020). In Australia, Smith and Yasukawa (2017) also discovered that VET teachers gained deep industry knowledge and technical authority through industry practice.

TVET lecturers ideally should be multi-faceted professionals with two-in-one qualifications (trade and professional teaching qualifications) (Schmidt, 2019; Swiss-South African Cooperation Initiative, 2016). Moreover, the lecturers were unfamiliar with the technological advancements and the current ways of working in current workplaces (Mabhanda, 2017). This study tries to determine what TVET lecturers learn in the industry during WIL. Against this background, DHET engaged SSACI to collaborate with colleges and the private sector to bring resources together and provide policy and programmatic support so that TVET lecturers could be up-skilled through industry exposure (Duncan, 2017; Swiss-South African Cooperation Initiative, 2011). SSACI played a major role as a negotiator to foster sustainable college-industry partnerships so that the TVET curriculum could be aligned to the needs of the industry concerning equipping the TVET lecturers with relevant industrial experience (Swiss-South African Cooperation Initiative, 2016). This led to initiatives such as lecturer WIL which was aimed at providing lecturer industrial experience. The current WIL initiative is built on SSACI’s earlier lecturer WBE project, implemented in 2012 and 2013 (SSACI, 2016). Twenty-eight TVET colleges were engaged in piloting work-based exposure (WBE) to provide workplace exposure for TVET college lecturers who visited companies for a week (5 days) to observe the daily routines (Swiss-South African Cooperation Initiative, 2016). The WBE initiative was replaced by the current lecturer WIL in 2014, a two-year programme explored by this study to determine the nature of TVET lecturers’ learning in industry and how they understood their learning.

The selection of lecturers to engage in WIL was based on the needs of lecturers who did not have the required industrial exposure to teach in TVET colleges. However, preference was given to entry-level lecturers teaching to give the experience back to the classroom (Majuba TVET College, 2019). In addition, TVET lecturers teaching vocational/technical subjects without a trade test automatically qualified to go on WIL. After the duration of the WIL programme, lecturers sit for a trade test in the field of specialisation (TVET College Times, 2019). A trade test is an occupational testing (examination to test practical knowledge and skills) culminating in a trade-testing certificate (Red Seal) if the lecturer demonstrates essential practical knowledge and skills.

There are 50 TVET colleges in South Africa with 250 registered campuses that deliver engineering and business programmes (Department of Higher Education and Training, 2018). There are 9 TVET colleges in KZN province, with their campuses summing up to fifty-four (Department of Higher Education and Training, 2018; TVET College Times, 2019). The provincial student enrolment for 2016 totalled 120 832, whilst lecturing staff numbers stood at 2426 (Department of Higher Education and Training, 2018). With these figures in mind, (Blom, 2016b) explains that TVET lecturers lacked industrial exposure, which helped reduce the mismatch of TVET college outcomes and industry standards. To this end, SSACI introduced TVET lecturer WIL to equip them with industrial experience to articulate the curriculum according to industry practice. It remains to be seen whether TVET lecturers learning through industrial exposure gained such skills. WIL is relatively new in South Africa, and there has not been much research on the areas indicated by Wedekind and Watson (2016); Jahonga (2020); McGrath and Powell (2016); McGrath et al. (2020).

Advocates for WIL such as Mutereko and Wedekind (2017); Papier (2017); and Blom (2015, 2019) acknowledge the limited research and the need for more engaged studies in this niche. The learning activities that offered some learning included bricklaying, plastering, welding, troubleshooting, machining, assembling parts, electrical installations, plant and general maintenance. Generally, what emerged around the nature of TVET lecturer learning during WIL was that these lecturers experienced learning through two major spaces: through practice and other people.

In interpreting data, literature was drawn to establish alignment with existing research. Kolb (1984) Experiential Learning Theory (ELT) was used to explain the findings. Kolb's theory portrayed experiential learning as appearing in a cyclical pattern with four stages: concrete experience, reflective observation, abstract thinking and active experimentation. Thus, the theory helped to understand whether lecturers experienced learning through all the stages in that order or a divergent manner determining how they experienced learning. The research question about the nature of TVET lecturer learning was addressed through themes and sub-themes. Seven themes emerged from the data addressing this research question. These were, learning through practice, learning from planned and unplanned maintenance and repair, learning through documents of practice, learning through diagnosis and troubleshooting, learning through fabrication and machining, learning through safety talks and learning through machines and equipment.

2. Methodology

As Cohen et al. (2017) explained, the research was located in the interpretive paradigm, as concerned with understanding the world as it is from subjective experiences of individuals. The study used a qualitative research approach and adopted a multiple case study design. The data were analysed qualitatively using the inductive process of organising data into themes.

2.1 Population

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). At least six months after their completion of WIL, lecturers were identified to capture their detailed experiences while they still remembered. 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.

2.2 Sampling

Sampling entails the selection of participants who wield rich data in research. The sampling technique used was a non-probability sampling design: convenience and purposive sampling because participants were selected according to the researcher's judgment. Convenience sampling is non-probability sampling where members of the target population, as noted by Cohen et al. (2017), are chosen for a study if they fulfil some particular practical criteria. In this study, Thee TVET Colleges were convenience sampled, wherein the population elements are selected based on the fact that they are easily and conveniently available" (Maree (2012, p. 177). In this regard, the participant selection criteria used was geographical proximity, availability at a particular time, easy accessibility or willingness to participate in the study. Thus, convenience sampling in this study was used to sample out the research units. The research participants, namely, 18 lecturers and 9 company personnel, were selected using purposive and convenience sampling. Therefore, these selection techniques were appropriate for the study. The industry personnel hosting WIL lecturers were conveniently selected to participate in the study as they had hands-on experience with lecturers during WIL.

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. Merriam (2002) supports 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, the purposeful selection is selected 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, p. 242). It suggests that purposive sampling can play a pivotal role in selecting participants with core experience and valuable input. Table **1** below shows the study participants.

Table 1 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).

Table 1 - 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	

2.3 Research Instrument

In this study, a voice-recorded face-to-face semi-structured interview was used to gather data (18 TVET lecturers and 9 industry personnel). The interview process involved introductions and explaining the purpose of the study. The informed consent form was explained to the interviewee before signing, stressing the liberty to withdraw at any time. The researcher gave some remarks at the end of the interview and offered refreshments. This instrument was suitable for gathering qualitative data in line with the research paradigm, design and approach. The tool was piloted to address possible shortfalls that may be deep-rooted in wording and ambiguity. Trustworthiness and dependability of research findings were tested by going back to participants the transcripts (Johnson & Onwuegbuzie, 2004). This exercise provided some confidence in the truth of the findings.

2.4 Interviews

A face-to-face semi-structured interview was used on 18 TVET lecturers and 9 industry personnel. Due to the scarcity of industry experience, available WIL lecturers in civil, electrical and mechanical disciplines were selected according to the researcher's judgment. They were either on WIL or had just completed WIL within six months. The assumption was that those who completed WIL would still have vivid memories about their experiences within six months. Purposive and convenience sampling were used to select lecturers and company personnel, respectively. 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 TVET lecturer and industry personnel interviews. The interview allowed the participants to air their views. The interview allowed probing the participants' responses to generate rich data. Attentiveness was achieved by using an audio recording device to give more attention to the participants rather than taking notes. Stringer (2008) agrees that voice recording allows acquiring a detailed and accurate interview account.

2.5 Data Generation Procedure

The data generation procedure was as follows:

- A clearance letter was obtained from the university Institutional Research Ethics Committee (IREC).
- Approval was sought from TVET college management.
- After finalising the appointment and meeting with the participants, introductions and explanations on the purpose of the study as per the consent letter were done, and the consent form was signed before the interview.
- The interview started using the semi-structured schedule and voice recording.
- Transcription of each recording followed immediately after each interview.

There were challenges to access industry personnel during the data gathering process as they shifted appointment dates due to work commitments. Gatekeeper letters were received late from college principals, which delayed the planned interview schedule. The training managers and the DHET provincial office were engaged to help facilitate the appointment meetings to circumvent this challenge. Overall, there was no impact on the findings.

3. Data Analysis

Qualitative data analysis is an inductive process of organising data into categories and identifying patterns and relationships among the categories, and asking questions about those patterns (Maree, 2012; McMillan & Schumacher, 2010). Similarly, Mouton et al. (2006) explain data analysis as breaking up data into manageable themes, patterns, trends and relationships. The following six steps of thematic data analysis were followed:

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

Thematic analysis was supplemented by narratives that aimed at tapping from the lived experiences of the research participants.

4. Results and Discussions

Both the responses from TVET lecturers on WIL and industry personnel were integrated and presented together as they were broadly similar. Where some differences occurred, they were highlighted. A total of 27 participants were involved in the study. Figure 1 below displays the theme and sub-themes. Those, which stood out according to participant responses were discussed in the discussion of results. The sub-themes that stood out in the responses were learning through practice, learning through planned and unplanned maintenance and repair and learning through documents of practice. Table 2 below shows the participant responses for each theme.

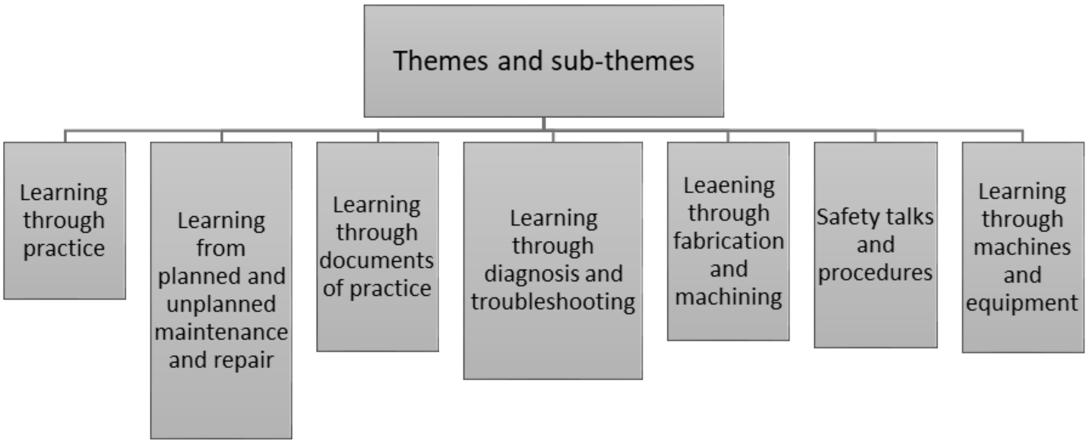

Fig. 1 - Themes and sub-themes

Table 2 below shows participant responses as highlighted under each sub-theme. The participants involved 18 TVET lecturers and 9 industry personnel in civil, electrical and mechanical trades.

Table 2 - Research participant responses

Sub-theme / Participant	Learning through practice	Learning through planned and unplanned maintenance and repair	Documents of practice	Learning through diagnosis and troubleshooting	Fabrication and machining	Safety Talks and Procedures	Learning through the use of machinery and equipment
Lecturer totals	17	15	14	8	8	8	6
Total for industry personnel	5	6	4	8	2	8	5
Grand Total for participants	22	21	18	16	10	16	11

Table 2 above shows lecturer interview responses. Learning through practice (17), learning through planned and unplanned maintenance and repair (15), documents of practice (14) were the standing out responses from TVET lecturers. There were eight responses stating learning through diagnosis and troubleshooting, another eight for fabrication and machining, and six acknowledged learning through the use of machinery and equipment. The researcher immersed in the data and went over the data repeatedly, shuffling and reshuffling to match related responses. Figure 2 below shows how data was organised.

Table 3 - Coding

Code	Categories	Theme
Job cards Log book Permit	Documents of practice	Learning through practice
Fault finding	Diagnosis and troubleshooting	
Welding Machining Gouging	Fabrication and machining	

Machine controls Induction process Training	Experimentation with machines and equipment
Sweeping Safety videos Hazards Working practices	Safety workshops and housekeeping
Safety meetings Tailgate meetings Safety tips Personal protective equipment (PPE)	Safety talks and procedures

Table 3 above shows how data was organised and coded to reflect the main theme which informed the study. Further discussion of the results follows below.

4.1 TVET Lecturers Learnt Through Practice

TVET lecturer learning through practice was one of the major themes that emerged. The findings confirm that the TVET lecturers were learning through practice. TVET policy prescribes that training programs require the WIL component to be authentic and set up in an industry-appropriate setting and become an integral part of the industry's experiential learning (Van der Bijl & Taylor, 2018). In the same study, it was further (Van der Bijl & Taylor, 2018) highlighted that TVET lecturers attend WIL to gain practical experience and bridge the college curriculum and industry requirements gap. This is a clear indication that lecturers learn through practice when they engage in hands-on tasks. The engagement of lecturers in the industry presented them with opportunities to participate actively in practical learning. Some lecturers also learnt from planned and unplanned maintenance and repair.

The WIL component offers TVET lecturers the experiential learning experience required to be successful lecturers in South African higher education spaces. This is supported by Kolb (1984), who stresses that experiential learning allows individuals to learn by doing the actual work in an industrial environment. In support, Billett (2010) highlights that learning through practice offers TVET lecturers and students the opportunity to develop the skills needed for work and that WIL is an essential process for developing occupational competence. Thus, learning through practice made a critical influence on the initial and ongoing development of occupational competence for TVET lecturers. Van der Bijl and Taylor (2018) reveal that Planned and Unplanned Maintenance and Repair

Some scholars (Akkerman & Bakker, 2012; Malale & Sentsho, 2014) confirm routine work as boring, where big companies use line production, and one repeats the same operation sequence. While routine work is monotonous, other people could grasp 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. The maintenance issue as a source of experiential learning was highlighted by Lecturer 16 from the electrical industry at Company 3, who expressed the following experiences:

> *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.*

The nature of lecturer learning during WIL was revealed 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 the findings of Tse (2010) that placements help develop practical skills through work procedures. 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 benefit (Kolb, 1984; McLeod, 2017). Mechanical fitter and turner Lecturer 6 at Company 2 said:

> *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 during WIL through routine maintenance, which involved repairing dysfunctional machines. Lecturer 6 seemingly experienced learning through stripping machines and replacing worn parts. Routine maintenance was described by Verma and Ramesh (2007) as an effective strategy of minimising operation costs and maximising plant availability since downtime could be costly. Kolb posits that individuals construct meaning from their experiences (Kolb, 2014). From the literature, practical industry experience allowed teachers to take a closer look into the world of work and to be able to adjust learning materials to industrial needs (Bukit, 2012).

4.2 Differences in Naming Documents of Practice

Data reveal 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 use of different names and terms to describe the documents of practice by companies shows inconsistency in the industry. Fourteen TVET lecturers during WIL were consistent in naming the documents of practice they learnt from, 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 instruct the task to be done. A 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 show concurrence on using 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 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.*

At Company 1, lecturer 1 explained:

> *"We used work permit which had details of tasks for each day. The permit or schedule was derived from the building plans".*

Artisans were team leaders who delegated subtasks to lecturers learning through practice during WIL, for example, collecting and packing back tools. 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 & Schuller, 2009). Even though a job card was available, the supervisor's decision took precedence by prioritising specific tasks over others to prioritise crucial operations. The findings confirm what Training Manager 2 said about team leaders prioritising work. Besides itemising the tasks, it appeared that the document also contained authority to work on the site. Hence, some called it a permit.

4.3 Learning from Diagnosis and Troubleshooting

Twelve lecturers learning through practice during WIL experienced learning from troubleshooting and diagnosis, which generally identified faults 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 learning during WIL also involved calibrating instruments' accuracy by collating their readings with standard measurement. According to Kolb (1984), lecturers had hands-on, new experiences and challenges during WIL. Kolb's theory also confirms learning to solve problems by thinking, doing and using learning to find solutions to practical tasks. The diagnostics and troubleshooting discussion suggested that TVET lecturer learning during WIL was also through fault-finding and repairing equipment. It appeared that only electrical and mechanical industries did fault finding (troubleshooting) and diagnostics because of the nature of the industries.

4.4 Fabrication and Machining Processes

Some lecturers learnt from fabrication and machine processes. In explaining TVET lecturers' 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 was a welding process where boiler making lecturers created a groove on metal using a gouging rod. Machining 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. 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. Reviewed literature confirms that lecturers who engaged in learning through practice during WIL updated their skills and knowledge through new equipment, tools, materials and technology (Clayton, 2013).

4.5 Learning when Experimenting with Machines and Equipment

It was found that some lecturers learning involved experimentation with 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 who referred to learning through machines and equipment. 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. Civil engineering Lecturer 1 at Company 1 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". In a similar vein, Training Officer 1 at civil engineering Company 1 reported: "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 Officer 1 and Lecturer 6. Drawing on Kolb's theory, this is consistent with concrete experience, which is practical exposure where lecturers learn new experiences (McLeod, 2013). The TVET lecturer learning from using equipment during WIL was preceded by training on using machines. Literature studied (Govender & Wait, 2017) revealed significant WIL benefits through induction, where lecturers are introduced to the equipment, working teams, and allocated tasks and responsibilities.

4.6 Learning from Safety Workshops and Housekeeping

The research findings indicate that TVET lecturers learnt from safety workshops and housekeeping. Safety issues were generally regarded as essential to lecturer learning 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. Twenty participants showed that they experienced learning through safety workshops. Safety referred 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). A majority of lecturers (17) revealed that there was learning through housekeeping discussions. Mesuwini (2021) defines housekeeping as putting order in a workplace regarding tools and equipment and keeping work areas clean and walkways free. Regarding housekeeping, mechanical Lecturer 9 at Company 2 noted: "*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".* A lecturer at a 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 (Lecturer 13).*

The responses suggest that the nature of lecturer learning through housekeeping instructions during WIL involved taking charge of housekeeping duties. They learnt to keep a clean workplace at all times. They also learnt to place clean tools at their correct places after work.

4.5 Learning from Safety Talks and Procedures

It was found that TVET lecturers learnt from safety talks and procedures. A safety talk continually reminded employees, including TVET lecturers, that safety was essential in the industry. Eight lecturers reported learning from safety talks and procedures. Safety talks and procedures differ from morning meetings in that only safety concerns were addressed, and they were conducted informally where no minutes were taken. Safety talks[1] showed workers and employers' commitment to safety issues by setting expectations, increasing hazard awareness, and reinforcing safe working practices (Olson et al., 2016). Mechanical Lecturer 6 at Company 2 said: "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 comments align with Kolb's theory, which recommends a concise and logical approach where people require a clear explanation about concepts rather than a practical opportunity. Researched literature Van der Bijl and Taylor (2018) confirms*: "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. During these safety talks, TVET lecturers learnt the essential safety tips to approach tasks cautiously. Kaskutas et al. (2016) study indicate that safety talks improved communication, empowered workers, reduced injuries, and improved workplace safety procedures. Lecturers learnt 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. Safety protocols align with Kolb (1984), who emphasises the process of adaptation to a learning environment.

5. Conclusion and Recommendation

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. Mechanical lecturers indicated learning from automated equipment, while civil engineering lecturers experienced learning from using new machines. Therefore, lecturer learning was centred on the use of machines.

The findings revealed that eight lecturers also experienced learning through comprehensive practical experiences on diagnosis, troubleshooting, and repair 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 reflected examples of concrete experience. During WIL, lecturers benefitted through artisans' guidance who explained job card instructions and delegated sub-tasks to lecturers during meetings. They analysed practical situations encountered and made conclusions that resulted in new learning experiences. In all industries, work schedules guided daily tasks and captured records of events.

According to Kolb (1984), lecturers used reflection-on-practice to look back and learn from reflection on their experiences to improve processes or uphold acceptable practices in their subsequent experiences. Lecturers must reflect on and observe their experiences from many perspectives, giving rise to new ideas or modifying existing concepts. Lecturers from civil and mechanical engineering industries were not allowed to use equipment without safety training, which minimised disastrous incidents. Therefore, lecturers learnt to identify hazards through videos, courses and teamwork. Through such learning methods, Kolb regards the lecturers as viewing concrete situations from several viewpoints, gathering information and using imagination to solve problems (Kolb, 1984). It appeared that safety team talks promoted learning through hazard awareness in all industries explored where these lecturers on WIL learnt safety practices and PPE use.

Overall, the nature of TVET lecturer learning during WIL was from hands-on experiences with machines and equipment, and safety talks and procedures. From the discussion, some TVET lecturers experienced all four stages of Kolb's theory during WIL, while others did not go 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. Therefore, TVET lecturers had different learning experiences depending on the hosting industry. To develop TVET lecturers in practical skills, they must engage in industry WIL from time to time to keep their skills dated.

The study recommends the policymakers and the DHET, Swiss-South African Cooperation Initiative (SSACI) and ity (SETAs) to start re-looking at the WIL initiative and how learning from practice can be factored in as a policy directive and necessary support and provision be made available for this crucial component of WIL as a means to improve TVET colleges as learning institutions.

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