JTET

http://penerbit.uthm.edu.my/ojs/index.php/jtet
ISSN 2229-8932 e-ISSN 2600-7932

Journal of Technical Education and Training

Occupational Training for TVET College Civil Engineering Students in the Modern Era: Has Anything Changed?

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DOI: https://doi.org/10.30880/jtet. 2021.13.04.007
Received 22nd April 2021; Accepted 27th October 2021; Available online 31st December 2021

Abstract: Developing and maintaining a definitive list of scarce and essential skills is crucial for the TVET sector. TVET colleges should swiftly work on 'workplace basics' skills to attract different industries for their students. The purpose of this study was to inspect how TVET colleges prepare Civil Engineering students with occupational skills relevant for modern engineering era. Descriptive research design was used to describe trends of connection with the help of secondary data. This research design assisted to describe how TVET colleges prepare its Civil Engineering students with occupational skills relevant for modern engineering era. This study adapted Carnevale's (1990) workplace basics as a conceptual framework. The collective findings revealed that TVET colleges faced several hurdles in their quest to equip Civil Engineering students with the necessary skills that would make them good candidates for taking up employment in industries against the backdrop of changes being wrought by the modern era. Among the recommendations, a call for professional teacher development with focus to 4th industrial revolution skills is made and that SETAs should support that initiative. Also such skills should be intensified in such a way that it may be easy to adapt to the 5th industrial revolution upon its arrival.

Keywords: Civil Engineering, TVET college, modern occupational training

1. Introduction

New occupations are continuously emerging and evolving, each with its own required set of competency-based skills (Carnevale & Smith, 2013). These days, employers in the engineering sector emphasise the need for employees to have modern skills for workplace effectiveness (Okoye & Nkanu, 2020). These may include teamwork, problem-solving skills and integrity/a work ethic (Okoye et al. 2020). While industries rely on TVET colleges to equip their prospective employees with these skills, they often turn out to be disappointed because TVET colleges work in silos when planning and implementing essential industrial skills training programmes (Masha, Mboweni & Mtshali, 2021). Underpinning this study were growing concerns in several quarters about rising numbers of unemployed TVET graduates - a situation that needs to be seriously addressed. As various governments in different countries are increasing their financial support for TVET colleges (Gamede & Uleanya, 2019), there is mounting pressure for sustainable solutions to be found to the problem of the ongoing misalignment between TVET training offerings and industry expectations (Mtshali & Ramaligela, 2021). Ultimately, everyone wants a better-skilled and more technologically responsive society, with ample opportunity for students to develop practical and relevant skills so that they can embark on fulfilling careers that will take them into the future. It is against this backdrop that this study investigates how TVET Colleges offering Civil Engineering courses are equipping their students with contemporary workplace skills fit for modern society.

The connections between the outbreak of the Covid19 pandemic and the rapid shift in the types of skills needed in the Civil Engineering sector are visible. In this pandemic era, most Civil Engineering workers are now being replaced by tools and machinery which automate their work (Bozkurt, Jung, Xiao & Rodes, 2020). The reduction in the number of construction workers is clear evidence of the need for modernised training strategies (Sherratt, Dowsett & Sherratt, 2020).

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This suggests that TVET colleges need to urgently review their industrial skills training techniques in light of the current and imminent changes. In this regard, Civil Engineering TVET college courses in South Africa, Limpopo and Mpumalanga provinces, in particular, were used as the focus of the study. Accordingly, this study contributes to the building of knowledge on how TVET College Civil Engineering students are being prepared for the modern-day world of work.

2. Responding to Scarce Skills in the Modern-Day Engineering Era

Developing and maintaining a definitive list of scarce and essential skills is crucial for the TVET sector. TVET colleges should work on 'workplace basics' skills to attract different industries (Mtshali & Ramaligela, 2020). In fact, in order to embrace globalisation and diversification, all hands-on practical activities performed in TVET colleges should adhere to contemporary workplace basics trends. These include instructional-processing skills, task-preparation skills and demonstration skills (ibid). Of course, innovation and modernisation of training equipment have always been important, considering that technological change has progressively reshaped the workplace over the past two centuries- ever since the First Industrial Revolution (Makgato, 2019). However, thus far, most countries still lack a National Skills Development Strategy (NSD) that explicitly speaks to the need for technologically advanced training equipment and skills relevance, plus the problem of skills shortages (Marope, Chakroun & Holmes, 2015). Possibly one may argue that there is a high cost associated with NSD especially in the procurement of tools and equipment (Gutowski, Hassan, Knedlik, Tong & Wohlmuth, 2020). Thus Nkwanyane, Makgato and Ramaligela (2020) argue that alternative ways must be found to skill TVET College students for job relevance in the absence of "fancy" tools and equipment. Hence given the economic state of South Africa, one is on the hypothesis that the tools and equipment used for occupational training are not of high technology. Consequently, the knowledge gap is on how the present tools and equipment in TVET colleges are used for modern era Civil Engineering training.

3. The Need for Occupational Training in South African TVET Colleges

South Africa has constantly been realising weaker economic growth rates than many other emerging economies, this is on the reasoning that TVET programmes are insufficiently responsive to the current labour market (DHET, 2019). The lack of practical relevance and responsiveness of TVET courses to the needs of the labour market, shared with the problems of insufficient infrastructure, equipment and tools (Eicker, Haseloff & Lennartz, 2017) and lecturers who are ill-equipped to teach hands-on, practical work (Banjo & Oludele, 2020), pose a huge challenge.

Enhancing the understanding of how a more sustainable learning environment can be created for Civil Engineering students at TVET colleges is crucial. This is so that all stakeholders can take advantage of the advances associated with the modern era. Failure to do so is likely to exacerbate the preparedness gap in the country and lower individuals' and companies' global competitiveness (Mtshali & Ramaligela, 2021). It will also result in TVET colleges falling further behind and losing their appeal as skills training providers (Ndung'u & Signé, 2020). In this way, this study delves into an important, but until now neglected, area of research which has long warranted more in-depth investigation. The value of the study is that it will provide insights for educators, policymakers and industry stakeholders into how to better prepare TVET colleges and their students to cope in a fast-changing industrial and technological environment. Thus this study was driven by the following research question:

RQ: How do TVET colleges prepare Civil Engineering students with occupational skills relevant for the modern engineering era?

4. Workplace Basics Framework

In order to investigate how TVET colleges prepare Civil Engineering students with occupational skills relevant for the modern engineering era, this study adapted Carnevale's (1990) workplace basics as its conceptual framework. According to Carnevale (1990) workplace, the basics are a set of essential skills that are needed to respond to the world of work. Thus this study investigates how those skills were used to prepare construction students for the world of work. Initially, Carnevale (1990) presented sixteen (16) skills that employers believed are workplace basics. Of those 16 skills, this study selected ten (10) and categorised them into three (3) themes namely; instructional-processing skills, task-preparation skills and demonstration skills. This was based on the fact that new occupations and skills have emerged ever since 1990 while some skills have automatically merged to give room for new ones brought by new technologies and occupational demands. Also, these skills were selected as they relate to the events of hands-on activities during Civil Engineering skills training in TVET college workshops.

So, Carnevale (1990) basic competency skills and influencing skills like reading, writing, computations and sharing leadership skills were themed as *Instructional-processing skills*. This is because collectively, these skills focus on the ability to read and understand instruction given by the employer and share leadership skills to execute projects effectively. Thus in this study, *Instructional-processing skills* focus on the initial stages of the lesson where students are given the opportunity to understand the objectives of the hands-on tasks and the plan of action, which involves the allocation of roles to people who will perform the tasks, among other things (Carnevale, 1990).

Developmental skills and Group effective skills like planning, interpersonal and understanding organisational culture fell under *Task-preparation skills*. This is because collectively, these skills focus on how individuals cohort to plan for resources to be used in order to carry projects effectively. So in this study, *Task-preparation skills* focus on how the tools and equipment are prepared for the execution of the intended practical tasks. Adaptability skills and Group effectiveness like teamwork, Negotiation, Solving problems creatively were adapted to *Demonstration skills*. This is because these skills to some extent, focus on demonstrating that the problems are solved. As such in this study *Demonstration skills* relate to the competencies involved in conducting hands-on, practical tasks, including how students handle and use tools and equipment, how the task was completed and overall student involvement (Carnevale, 1990). This study adapted this framework because it assisted in determining important phases that take place when one is being capacitated with occupational skills.

5. Methodology

This study used a descriptive qualitative research design, with a quantitative component to obtain more insight into the EGD classroom activities. (Magilvy & Thomas, 2009). Descriptive research was used to describe trends of connection with the help of secondary data. This research design assisted to describe how TVET colleges prepare Civil Engineering students with occupational skills relevant for the modern engineering era. In order to understand this phenomenon, this study used non-participant observation as a data collection method. Non-participant observation is a relatively non-obstructive data-collection technique whereby a researcher watches the subjects of his study, with their knowledge, but without taking an active part in the situation under scrutiny (Carter & Henderson, 2005).

5.1 Population and Sampling

In terms of population and sampling, the population of this study was seven (7) public TVET colleges in the Limpopo province of South Africa. The population comprised of 7 Civil Engineering lecturers and a total of three-hundred and twelve (312) National Certificate Vocational (NCV) Civil Engineering students. From this population, this study purposively sampled four (4) of these TVET colleges, students and their lecturers, as they were the ones offering Civil Engineering courses and so the researcher believed that they would have the necessary information (Green & Thorogood, 2018). This study purposively sampled six (6) Civil Engineering lecturers in the afore-stated TVET College campuses and a total of two-hundred and fifty (250) students. As a result, they were two-hundred and fifty-six (256) respondents in this project.

The scope of the research was limited to National Certificate Vocational (NCV) Civil Engineering courses because the researcher found that they were the only group that had compulsory hands-on training and that they needed particularly urgent attention in TVET colleges. It is worth noting that the sampling was guided by the particular trade forming the focus of this study. In order to generate the rich data needed to answer the question posed by the study, only those TVET colleges that ran Civil Engineering courses and those industries that were active contributors to the WIL programme were included in the sample. The following table outlines the activities observed in each TVET College.

Table 1 - Practical assessment tasks observed in the TVET colleges

TVET college	Courses offered	Tasks observed
TVET College A	Construction	Masonry (cavity walls)
TVET College B	Construction	Masonry
	Civil services	Pipe stack systems - water supply systems, pipe joints
TVET College C	Construction	Tiling + masonry (house building)
	Civil services	Drainage systems + water supply systems
TVET College D	Construction	Masonry (staircase building)
	Civil services	No practical (no tools and equipment). There were, however, registered students for this course.

5.2 Data Collection Procedure and Instrument

The data drawn from non-participant observation sessions were analysed descriptively per item in the observation schedule. Using this technique ensured that the targeted events were recorded (Creswell, 2013). This involved looking at how (and how well) the TVET colleges' students were being prepared against the skills demands of the modern engineering era. It focused on what was happening in construction and civil services courses in accordance to Carnevale's (1990) "workplace basics" themes.

The data that had been recorded on video was transcribed manually into narrative story form and then coded under topics, also according to Carnevale's (1990) "workplace basics" themes. The researcher was assisted by his research

assistant to capture audiovisual recording in the following phases. Phase 1, was based on instructional-processing skills where the researcher observed if lecturers had explained the practical activities given to students for conceptualisation and if students allocated roles and responsibilities after being given the practical activities.

Phase 2 was based on task preparation skills where the researcher observed if lecturers had the set-out first-aid kit in case of emergency, if students were monitored to wear protective clothing before commencing with activities and if the physical lay-out of the workstation was ready to perform hands-on activities. Phase 3 was based on observing the occurrences of demonstration skills where safe handling of tools and machinery and if the given hands-on activities were completed by same the group of students from start to finish. All these observations were made on the first semester of the 2020 academic year, prior to the country lockdown because of the pandemic.

5.3 Ethical Consideration

A study of this nature needed to be conducted in line with the research ethics codes and requirements of the relevant institutions. Ethical clearance was sought from the Ethics Committee affiliated to the author after which permission was granted to carry out the research within acceptable ethical boundaries.

- **Permission to Conduct the Study**

Permission to conduct this study was requested from the TVET college campus managers to allow the researcher access to their premises. Also permission was sought from the lecturers and students involved to give the researcher access to their respective teaching and learning stations. Permission letters were given to inform about the intention behind the study so participants could choose whether or not to take part (Nnebue, 2010).

- **Voluntary Participation**

No participant was coerced to take part in the study (Babbie, 2016). The participants were entitled to give their consent initially and to later change their minds, without any questions being asked. As indicated, this was because the participants needed to understand their role within the context of the study and to be fully aware of what the research entailed.

- **Anonymity and Confidentiality**

The data collected was used only for research purposes, within the confines of the study. **Anonymity** was ensured, with the researcher informing the participants that their names would not appear in the research reports. For reporting purposes, the researcher gave the participants pseudonyms and in the case of audio-visual recordings, their faces were hidden to protect them from possible physical, emotional, intellectual and social harm (Tarrant, 2007). **Confidentiality** was also ensured, with the researcher assuring the participants that the information they provided would not be shared with anyone else and would be safely secured in a storage facility provided by the institution where the researcher was studying (Badiee et al., 2012).

- **Respect for Participants' Dignity**

In order to ensure respect for the dignity and well-being of the participants, the researcher did not judge or discredit participants' views, inputs and decisions. During the interactions with participants, respect took precedence. Furthermore, the researcher ensured that the autonomy of the participants was protected in that they were not made to feel vulnerable or marginalised. At no time did the researcher lie or deceive the participants (Babbie, 2016).

5.4 Data Analysis

Data analysis occurred simultaneously with data collection, this was per wisdom by Stake (1995) who stated that there is no specific point during the research process when data analysis should start. The researcher ensured that he is familiar with the data through reading, providing detailed descriptions, classifying data into themes and then interpreting that data statistically. The data drawn from non-participant observation sessions were analysed in terms of Carnevale's (1990) 'workplace basics' themes, namely: instructional-processing skills, task-preparation skills and demonstration skills. The concerns which this study was zooming on were explicitly described under data collection procedure and instrument. The occurrences of activities by each college were compared to the other and all similar events were recorded in statistical presentations. This opened a room for qualitative data to be presented quantitatively. Such an approach has previously been done and supported by several scholars such as Yardley and Bishop (2008); Hammersley (2017) and Mtshali (2020).

6. Results Presentations

A total of 256 respondents were involved in this study, 6 of which were lecturers. All lecturers were less than ten years of teaching experience at the sampled TVET Colleges. None of them possessed a professional teaching qualification and this is a common practice in most TVET colleges. Part of the reason for this is that only a few universities of technology have been tasked to develop programs for TVET college lecturer qualifications which were not there before. Hence on

the sampled lecturers, the highest qualification which 3 (50%) of them had was National Accredited Technical Education Diploma (NATED) on level 6. The remaining percentage had National Certificate Vocational (NCV) combined with either NATED level 4 up to NATED level 5. A notable number of male students 189 constituting (76%) compared to 24% of females were enrolled for the courses discussed below. Respectively, the respondent's demographic information is shown in Table 2.

Table 2 - Respondent's demographic information

Demography Aspects	Frequency	Percentage (%)
Lecturers' Gender		
Male	4	67
Female	2	33
Students Gender		
Male	189	76
Female	61	24
Teaching experience (Civil Engineering)		
1-10 years	6	100
10 and beyond	0	0
Professional qualification		
NATED / NC (V)	3	50
Diploma / N6	3	50

Result are presented in accordance to the research question.

RQ: How do TVET colleges prepare Civil Engineering students with occupational skills relevant for the modern engineering era?

In order to respond to this question above, data was presented thematically, starting with Instructional processing skills followed by task preparations and demonstration skills.

a) Instructional Processing Skills Theme

The results presented below give a picture of how construction and civil services courses dealt with instructional processing skills themes. Often practical activities have limited room for active conversations between the lecturer and his students. This comes at an assumption that students will instantly understand the practical activities given to them since the lecturer would have covered most of its contents during theory lessons. It must be emphasised that lecturers have a duty to always clarify misconceptions in order for students to know the purpose of the activity and roles players. This will mean that students will be acquainted with knowledge about key role players in the execution of any Civil Engineering project. So the excerpts (Table 3) below summarise how instructional-processing skills were carried.

The findings indicate that, although a portion of students were given activities without having been explained by their lecturers, they still saw a need to meet up with their team members because they understood that their activities needed team effort. This is a common course for most Civil Engineering activities that they should be carried-out by a group of individuals. Under normal circumstances, a project team would prepare themselves before engaging in any projects that they are given (Murray, McQuade & Hendry, 2019). For instance, when a proposed project is due to commence, role players such as surveyors, contractors, building managers, operations managers, tradesmen, apprentices and labourers converge to discuss how the work will be successfully executed and the expected time frames. This assists role players to determine the crucial expertise that is needed and to avoid unnecessary skills duplication, which can be costly. TVET colleges are therefore expected to develop their students' instructional-processing skills before they commence work on a project. In the case of these TVET colleges' construction course, this skills development process was neglected by half of them, yet it is an essential part of being responsive to industrial needs.

Table 3 - Instructional processing skills

Instructional-processing skills theme	Status of activities *(frequency percentage)*			Total Frequency percentage
	Done	Partially done	Not done	

Did lecturers explain the practical activities they were giving to students for conceptualisation?	50%	-	50%	**100%**
Were students given ample time to seek clarity and /or discuss the activity with their group/ team members?	33%	67%	-	**100%**
Did students allocate roles and responsibilities they will have in developing the practical activities?	-	83%	17%	**100%**

According to the building regulations pertaining to plumbing in South Africa, no person is allowed to commission someone to do plumbing work unless he is a trained plumber and his work has been inspected by a local authority. However, in the case of these TVET Colleges, the Civil Services lecturers staff had NC (V) qualification which means they had not undergone inspection before they train students, this indicates gross negligence by the TVET Colleges and respect for the trade. According to Arthur, Rouf, Rahmayanti and Maulana (2019), the role of plumbers is to determine the quality of water installations, networks and management. In this way, plumbers play a key role in maintaining the health of buildings and their internal environment. Given the failure of these TVET colleges to properly equip students with instructional-processing skills, it is safe to assume that many will face challenges in maintaining healthy environments in the buildings in which they work.

b) Task Preparation Skills Theme

As previously indicated, task preparation deals with how students prepare themselves to execute hands-on practical tasks. In the case of this study, it was important to observe if First Aid kits were made available in cases of emergency if students were wearing protective clothing and were given a chance to organise working tools and consumables. So the excerpts (Table 4) below summarise how task-preparation skills were carried.

Table 4 - Task preparation skills theme

Task preparation skills theme	**Status of activities** *(percentage)*			**Total Frequency percentage**
	Done	Partially done	Not done	
Did the lecturer set out / made available first-aid kit in case of emergency?	17%	-	83%	**100%**
Were students monitored to wear protective clothing before commencing with activities?	17%	50%	33%	**100%**
Was the physical lay-out of the workstation ready to perform hands-on activities?	-	50%		**100%**
Did students organised working tools and consumables in preparation of their tasks?	17%	67%	16%	**100%**

Most TVET colleges, to some extent, found it challenging to execute task-preparation skills. While most students wore protective clothing and had the tools for the tasks they needed to perform, first-aid and fire-fighting equipment was not in evidence. In fact, there was no visible emergency-related equipment. In this regard, it can be argued that these TVET colleges were in violation of the Occupational Health and Safety Act, no. 85 of 1993 as they were putting the safety and health of individuals at risk. There are very strict regulations that must be upheld by those who train for hands-on, practical skills - including safe operations in the working environment, visible workplace safety rules, the safe handling of materials and equipment, the provision of fire extinguishers and first-aid equipment, and adherence to personal safety rules, among other things. However, the TVET colleges appeared to simply emphasise personal safety rather than adopt broader workplace policies in line with the Act. Consequently, their ability to equip students with task-preparation skills was constrained. According to Mtshali and Ramaligela (2020), TVET colleges and instructors should continually be committed to equipping students with skills that will help them to be productive in the real world. These authors further recommend that lecturers and teachers should use all the resources at their disposal to create industrially responsive teaching and learning experiences. In particular, ensuring that students wear protective clothing and use fit-for-purpose tools is a testimony of responsiveness to the real-world, industrial environment.

c) Demonstration Skills Theme

Demonstration skills are key in the occupational training of TVET Colleges and without them, students can never be competitive in the global economy. Civil Engineering students were observed if they could handle and operate tools

and machinery safely and use them for their purpose. Also, it was important to explore if students were all participating as per their roles during the hands-on practical activities. Completion of all tasks given to students was another aspect that was important to observe, thus the findings below in Table 5.

Table 5 - Demonstration skills theme

Demonstration skills theme	Status of activities *(percentage)*			Total Frequency percentage
	Done	Partially done	Not done	
Did students handled and operated tools and machinery correctly and safely?	33%	67%	-	**100%**
Were students using tools and machinery for their purpose?	17%	83%	-	**100%**
Were students actively engaged in their roles during the task?	-	100%	-	**100%**
Were the given hands-on activities successfully completed by same group of students from start to finish?	-	-	100%	**100%**

With regard to demonstration skills, most TVET colleges had problems equipping students with these skills, which has led to a lack of competency in performing hands-on, practical tasks, understanding how tools and equipment can best be used, and how to steer a task to completion. Astonishingly, the TVET College D civil services students engaged in no practical activities at all, nor was there evidence of any practical work ever having been done. The workshop had no posters or charts to indicate any link to civil services. According to Mutua, Kimiti & Mulwa (2019), students should have exposure to multiple work environments and tasks to enhance their versatility and employability. However, this was certainly not in evidence in TVET College D. In TVET College A, in turn, students involved in building a cavity wall failed to demonstrate proficiency in the use of brick-force, wall ties, weep holes and external joints.

Not a single student or group had, during their training, been exposed to a task from start to finish. Part of the problem was insufficient training tools and equipment. This added to the colleges' challenge of equipping their students with clearly demonstrable skills. Several authors - including Oketch (2007), Okorafor and Okorafor (2011) along with Caves, Ghisletta, Renold and Kemper (2019) - highlight the fact that TVET colleges still experience challenges in accessing the necessary tools and equipment for hands-on work because they are costly, yet essential for effective training.

7. Discussion and Conclusion

The collective findings revealed that TVET colleges had several deficiencies in their quest to equip Civil Engineering students with occupational training aligned to the modern era demands. This implies that there were challenges to execute the adapted Carnevale's (1990) workplace basics. For instance, sampled lecturers were constrained in their attempts to facilitate hands-on, practical training - mainly due to limitations in available infrastructure, equipment, tools and materials. AS case in point, TVET colleges had bricks, lime cement, and bricklaying and plastering tools to use in their construction course. Practicals had to be tailored around available resources at the colleges.

A significant weakness in terms of the training was that lecturers had no specific lesson plans or outlines, nor documented task descriptions. Lessons were often conducted in an ad hoc fashion. When students were merely given tasks verbally, they were unable to truly embrace the task and mentally and physically prepare for it. Without specific guidelines and parameters, students were often left to work things out for themselves, which was potentially time-wasting and did not necessarily build the right skills.

During the observation, it was evident that a large proportion of students were observers during a task, while a very few students were repeatedly used to do the practical work. This was particularly evident, for example, at TVET College C where the same woodworking students would end up measuring and cutting pieces of wood and assembling and erecting roof frames, while others in the group looked on idly. According to Yangben and Seniwoliba (2014), this robs students of the chance to demonstrate their knowledge and skills and could be very damaging to students' motivation levels and career prospects.

Lecturer supervision and facilitation were often poor during practical lessons. For example, when a group of students on the construction course at TVET College A were tasked to build a cavity wall, they made innumerable mistakes and the group task ended up being a failure, but with proper supervision/facilitation, the outcome could have been very different. Another disturbing factor revealed by the study was the inappropriate manner in which lecturers carried out competency assessments among students. To the researcher's surprise, the rubric used to assess skills was an individual effort (such as planning and preparation of tasks), yet marks were awarded on the basis of the group effort. It is not clear

how some students were awarded marks based on group performance when they were not actively involved in the group practicals. This suggests that the manner and standard of student assessment are severely compromised.

Finally, the study found that TVET college students generally did not complete any of the practical tasks assigned to them, with subsequent groups having to pick up where the earlier groups left off (and sometimes having to correct mistakes or substandard workmanship). One of the leading factors contributing to incomplete tasks is insufficient training equipment. This finding resonates with the findings of Afeti and Adubra (2012) and Isaac and Manto (2019) that, in order to equip the student with first-class and relevant hands-on experience and skills, appropriate workshop equipment and sufficient supplies of material must be provided for students' use.

In this modern era in which 4IR is permeating all economic sectors, TVET colleges must - with the help of SETAs and industry stakeholders - constantly review their operations in order to equip Civil Engineering students with relevant skills, using updated tools and equipment and an appropriate pedagogical approach. Also, such skills should be intensified in such a way that it may be easy to adapt to the 5th industrial revolution upon its arrival.

8. Implication and Recommendations

This study provides the greatest benefit to research on Civil Engineering TVET college courses - which has attracted little research attention to date - by unpacking the present achievements and shortfalls of TVET Colleges in the run to become responsive to the modern era. The study is significant in a number of ways. Firstly, it provides insights for the Department of Higher Education and Training (DHET) on issues requiring urgent attention in TVET institutions, while offering a holistic view of where the priorities lie regarding the demand for, and enhancement of, skills in the Civil Engineering sector. Secondly, the study assists to create awareness of the lecturers' capacity to teach hands-on practicals, even when they do not hold any qualification. Lastly, the study shows how the current training of Civil engineers is segregated to the bigger vision of the fourth industrial revolution, how practical activities keep on repeating from previous years. The recommendation to this effect is that each TVET college should have a dedicated team that will liaise with Sector Education and Training Authorities (SETAs) to plan hands-on training activities that are timely and in demand, and encourage the use of appropriate technologies to solve contemporary problems in the built environment.

Acknowledgement

I would like to thank Professor Manto Sylvia Ramaligela for allowing me to try this scholastic journey on my own and spread my wings in knowledge production. A special thanks to *O hlabangani*; Khwezi, Nqobile, Mxolisi, Ntombifuthi, Phumzile, Daniel, Fikile and Nonkululeko Mtshali for supporting this research project

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