FACTORS THAT CONTRIBUTE TO CHALLENGES ENCOUNTERED BY ENGINEERING LECTURERS AS THEY TEACH VOCATIONAL SUBJECTS IN TVET COLLEGES

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Article Info	Abstract
	Economic prosperity of any country is heavily reliant on the knowledgeable and skilled graduates produced by the TVET colleges. Eventually, these graduates are expected to be absorbed by the industry and corporate business. There must be adequate support structures for training students in skills by lecturers as TVET colleges are preparatory grounds for skills. Several challenges encountered by engineering lecturers leading to a high failure rate and hampering the aspirations of the country have been observed. To close that gap, this study investigated those factors that contribute to challenges encountered by engineering lecturers as they teach vocational subjects in the Report 191 programmes of TVET colleges. The study only focused on lecturers teaching Report 191 engineering subjects because of the low output in their specific learning areas. Scaffolding Theory guided the study with links towards training of lecturers for institutional development and improved outcomes. Data collection process was in two folds and was collected through observations (n=12) and semi-structured interviews (n=24) from identified lecturers in three different TVET colleges. Preliminary findings suggested that current Report 191 engineering lecturers experience teaching challenges in delivering vocational subjects which is a determinant to the overall students' pass rate and progression. Evidence of lack of planning and disorderliness; incorrect teaching and learning techniques and inadequate understanding

of curriculum were highlighted from the observational findings. Findings of interviews displayed challenges emanating in the transition from school to TVET colleges; limited institutional and administrative support; and exclusive personal factors on technology usage which provided a broader sense of the study. Report 191 engineering results may remain stagnant, and graduates suffocate the TVET colleges if drastic steps cannot be taken to address the challenges. Limited economic participation from graduates which automatically leads to social ills will persist if these teaching challenges are not eliminated entirely. Constant lecturer development regarding instructional practice may divert old ways of teaching into new ways and improve outcomes.

INTRODUCTION

Skills produced by the Technical and Vocational Education and Training (TVET) colleges are relevant for socio-economic development and sustainability of livelihoods. In practical terms, this may not be possible if the conditions at TVET colleges are not conducive to teaching and learning, theory and practice. This was visible through Report 191 engineering subjects in TVET colleges whose performance was seen to be below par. Outcomes of the Report 191 engineering subjects in three different TVET colleges in Limpopo Province have been cause for concern wherein 44 individual subjects in three different grades have performed below the 40% pass mark from a single Trimester in 2021; 61 individual subjects in 2022 and another 44 individual subjects in 2023 (Limpopo TVET Colleges Provincial Results Analysis, 2023). Since some of the students might have enrolled in various TVET colleges during the height of COVID-19, such underperformance could be attributed to the disruptions caused by the pandemic. For instance, in 2021 academic year, the underperformance could be attributed to the effects of the pandemic. This was precisely so because teaching and learning had to undergo very rapid adjustments with intermittent school closures, delays in examinations and disruptions to students' pathways (Silva & Pinto, 2023). To minimize the spread of the pandemic, some countries like Iceland quickly resorted to online teaching in Germany students' internships were disrupted (Silva & Pinto, 2023), and in Bulgaria, online theory classes began for two or three days a week (Cedefop, 2020). In the later years of academic preparations in 2022 and 2023, there were no more fears or academic disruptions by COVID-19 but yet the high failure rate in Report 191 engineering subjects had constantly persisted. There might be a shared belief in educational circles all over the world that failing or passing results are determined by what teachers and students do in class.

The continuing high failure rate in the Report 191 engineering subjects brings discontent and eagerness to investigate challenges that may be encountered in teaching those

vocational classes. Challenges can be detected and identified anywhere and anyhow in an educational setting. Ryder (2009) observed that teachers were found to be content with certain challenges in the teaching and learning environment including students' behaviour management; planning and programming; assessment; communication with parents, meeting different interests, abilities, skills, and knowledge of students; technology and teaming up with other teachers (Anderson & Donkoh, 2016). None of these challenges are concerned with the various methods a teacher should employ in class and/or also high levels of understanding of the content. It can be argued that if the teacher passed his engineering subjects of qualifications within the region of 40%, there is the likelihood of passing his students around that margin and less. The worst case scenario occurs when lecturers in vocational institutions are hired merely because there is the entire scarcity of professional teachers produced in the engineering field. Eventually, TVET colleges are bound to appoint into engineering faculties, tradesmen with only academic qualifications but without professional teacher qualifications. These teachers may experience pedagogic/content challenges in effectively delivering high-quality performance in the subjects they teach.

The subject didactic teaching method had been traditionally the motive behind the combination of knowledge transfer of specific learning areas into pedagogic skills. Improvement of quality teaching in the vocational classroom should be driven by the desire to enhance learning skills and knowledge. At the same time, students should pass and progress with good grades. Current teachings require familiarity in teaching with technologies while the lecturers, on the other hand, must make use of modern, and innovative methods in facilitating learning through charts, graphs, images, pictures, diagrams, articles and models (Kapur, 2020). Challenges in the lack of pedagogic skills and content knowledge in a specific engineering learning area do not, however, exist in isolation. For example, in the study conducted by Kimotho (2016), nine pedagogical challenges were identified namely, learning styles and methodology; the nature of students and teaching methodology; classroom diversity; subject matter; context or teaching environment; teachers' awareness of the various teaching and learning methods available; time; the nature of examinations and the research gap. Kimotho's study focused on general teaching challenges in schools while the current study is focused on challenges of teaching engineering vocational subjects from the TVET college sector. In light of the above assertion, there is a content gap between subjects done at high schools and those within the engineering faculties at TVET colleges. This may raise another aspect that teaching difficulties are immeasurable. Teaching difficulties can only be derived from the performance of the students. With identified factors that would emerge from the study findings, recommendations of the study may likely address the practical competence in vocational classrooms.

TVET college graduates are expected to participate in the economic structures of the country. Improved teaching challenges encountered by engineering lecturers of vocational subjects increase certification rates of TVET colleges. After completion of

their studies, graduates will be able to enter the economic sector and industry with the most prerequisite skills and knowledge required in the job market. On the other hand, educational stakeholders, whether internal or external look forward to a common goal that students should progress to the next grades. With teaching challenges observed in engineering vocational subjects, students' progress opportunities become minimal. This simply means that teaching challenges are all a deterrent knowingly or unknowingly aimed at blocking the progress of students from one level to the next. Challenges encountered in the teaching of engineering vocational subjects need to be identified so that appropriate mitigation measures are implemented.

A study conducted by Lew & Nelson (2016) highlighted some of the challenges faced by TVET teachers including classroom management, curriculum planning and implementation, conducting assessments and workload issues. These challenges may still be prevalent to this day because traditional teaching methods are yet to be removed from lecturers' pedagogical knowledge and practice. Lecturers should manage approaches and processes that would enable the achievement and maintenance of the classroom environment to teach and instruct using tools to produce behavioural change (Bosch, 2006). Failure to apply good classroom management skills as a teacher may give room for students to misbehave without directing their efforts towards academic achievements (Lew & Nelson, 2016). Whatever the case may be, every aspect of classroom management needs to be performed under the guidance and confines of the laws of education to avoid confrontation with the authorities.

The lack of modern technologies and equipment in training institutions is one major challenge facing TVET teachers. Students have to learn these technologies from their classes. The absence of technological resources and knowledge creates a skills gap between what learners are exposed to in college and what they are expected to do in industry (Lindell, 2022). TVET colleges need to consider expanding collaborations with the industries. A memorandum of understanding for colleges can be signed to bridge the training resources and skills gap. This enables colleges to supply industries with a workforce that are technologically savvy. The essence captured here is to ensure that lecturers need to possess 21st-century competencies and skills. Such skills and competencies can be used interchangeably as they both emphasize creativity, critical thinking, collaboration, problem-solving and technology (Kan and Murat, 2018). This goes a long way because what lecturers teach students is what students will do as graduates when they begin to ply their trades. There must be a notable skill transfer from lecturers to students. Lack of competencies and skills extends beyond those mentioned by Kan & Murat and is not limited to an inadequate supply of qualified teachers, a lack of financial and physical resources, ineffective development programmes that enable teachers to acquire the necessary knowledge and skills, and a lack of efficient leadership and management structures (Du Plessis & Mestry, 2019). This denounces the very existence of educational institutions because these challenges centre around authority, people who give instructions and orders.

Lecturers are found in the teaching and learning heterogeneous environment. The student population varies in backgrounds, culture and life's perspective which bring both a challenge and an opportunity (Aydin., Ozfidan & Carothers, 2017). TVET colleges have to place attention on vocational education as an investment in human beings for the development of human resources, skills, motivation, knowledge and attitude (Tripathi & Kumar, 2018). Not only do lecturers benefit from this arrangement but a matter of improving performance, effectiveness, and ultimate success.

The lecturers must ensure regular interaction occurs between the basic human capabilities of the students to finally enhance their cognitive capabilities (Munna & Kalam, 2021). Teaching is about advocating for a learning experience that works as future tools to perform duties in business or industry sectors. In this case, the focus of attention shifts from traditional teaching to online but not to permanently exclude face-to-face teaching. Based on the views above, blended learning has become a constant feature in recent studies and in the learning context. The use of blended learning provides flexibility in terms of time, location and pace of learning. Students can access online materials and resources at their convenience, enabling personalized learning experiences that accommodate their individual needs and preferences (Eslit, 2023). A new common concept has been developed to advance the idea of blended learning, that is the flipped classroom. Eslit (2023) posits that flipped classrooms are a variation of blended learning that offers a transformative approach to instruction by reversing the traditional learning model. Another study went further to describe the activities that occur within the flipped classroom context. Renninger & Shumar (2021) highlighted that in a flipped classroom, students review instructional content independently outside of class and engage in hands-on activities or discussions during face-to-face sessions. Several benefits could be sourced by students for effective use of the flipped classrooms in that it promotes active learning; allows students to learn at their own pace; fosters increased classroom interaction; emphasizes the application of knowledge; and students to take ownership of their learning (Eslit, 2023). To work on flipped classrooms or rather blended learning, lecturers have to transform their thinking that the textbook and traditional ways of teaching are alpha and omega. By extension, TVET colleges are tasked with the responsibility of making blended learning resources available to avoid negative responses like, "We don't have resources".

To improve lecturers' performance and effectiveness, the most important aspect is to first enhance lecturer competencies. According to Blömeke & Delaney (2012), the description of competencies involves professional knowledge and beliefs, attitudes, skills and motivational variables that support the mastery of effective teaching and learning. This comes close to lecturers understanding the content delivery through a series of stages outlined in the lesson plan of every module. Students learn better when lesson presentations are accompanied by demonstrations, and as they observe they can provide proper detailed descriptions verbally as well as in written work. As a result, this shows

how students benefit from participating in lessons developed by teachers' knowledge of how learners learn through discussions around planned research lessons (Murata, Bofferding, Pothen, Taylor & Wischnia, 2012). Therefore, lecturers are required to be encouraged in an attempt to improve teaching and learning so that they engage students in the participative learning experience.

As teaching and learning continue, there comes a time when students' understanding must be tested against knowledge and skills presented as assessment. The 21st century assessment practices focus on what learners understand and can do, and how best a teacher is able to perform in the class (Lakshmi & Majid, 2019). Prior towards testing understanding, lecturers must engage in finding out the background knowledge level of students at the beginning of every new lesson unit (Lakshmi & Majid, 2019). Assessment practices should be aimed at reinforcing the role of collecting information to improve the students' learning abilities (Mutlu, 2020). Challenges relating to assessment have an indirect contribution to teaching's negative outcomes which in fact can result from inadequate knowledge of fundamental assessment and measurement concepts (Bichay-Awadalla & Bulotsky-Shearer, 2022); inadequate training in assessment (Stiggins, Conklin & Bridgeford, 1986) and failure of educators to correctly utilize the guidelines for the learners in assessment courses (Di Liberto, Casula & Pau, 2022). Assessment practices will forever remain a contentious aspect within the context of TVET colleges. Lecturer creativity and innovative strategies for assessing students must be assimilated from the experience in the vocational class.

Lecturer professional development had on many occasions focused on general facilitation, assessment, and moderation of short courses to the exclusion of specific engineering learning subjects. The short courses are limited in terms of improving lesson planning and presentation of the content knowledge in that subject. Good planning and presentation would lay the foundation for standardized tests to determine TVET College's success, allowing students to be creative and use the technology to support necessary skills and learn in unique ways (Alismail & McGuire, 2015). Heads of Departments (HoDs) and Senior Lecturers should implement rich curricula and textbooks that align with the standards. In the process, they must work hard to ensure that all lecturers in their employ understand and embrace the curriculum that is focused on outcomes (Bickford, 2017). Lecturers' experience compels them to know the ways in which learning takes place and the appropriate levels of intellectual, physical, social, and emotional development of students (Germuth, 2018). Students' difficulties are displayed by misunderstanding the content delivered during the lesson and making it uneasy to ask questions for the lecturer to clarify. While this could be the general problem, lecturers need to resort to planning instructions appropriate for the students; use a variety of instructional methods; integrate and utilize technology in their instruction; help students develop critical thinking and problem-solving skills; help students work in teams and develop leadership qualities; communicate effectively and use a variety of methods to assess student learning (Germuth, 2018).

Theoretical framework

Suitability of the prospective theoretical framework aligns with the type of findings and conclusion the researcher intends to achieve. The scaffolding theory was selected to guide this study. The scaffolding theory was explained and applied in a manner that shows the detailed significance of labour maximization and how an organization accumulate employees' knowledge, skills, and abilities that improve capacity (Wuttaphan, 2017). In the TVET colleges sector, lecturers being the sole facilitators of vocational education are at the receiving end of the scaffolding theory. For lecturer effectiveness in their teaching experience, the scaffolding theory should ascertain that human beings expand their productive capacity based on increased education and training (Jaffu & Changalima, 2022). Productivity in the teaching and learning context hinges on the knowledge and skills of lecturers which needs to be developed through organized human resource training. McConnell, Brue & Macpherson (2009) agree that a more educated, better-trained person is capable of supplying a larger amount of useful productive effort than one with less education and training. This has to become the primary focus for TVET colleges to train their workforce, especially the lecturers since they are expected to produce positive results in the form of students' progression. The mandate of TVET colleges is to produce a skilled workforce but in essence, the skilled workforce can only be as a result of well-trained service providers, those lecturers. The view of using scaffolding is for the lecturers to employ scaffolding as a tool, making students become self-regulating-students and problem-solvers (Hartman, 2002).

Scaffolding should not be stuck in mentoring students throughout their entire lives but short-lived. Of crucial importance, through Scaffolding, lecturers help students to complete tasks or master concepts independently (Chang, Sing & Chen, 2002). It is based on its characteristics as outlined here that it provides clear direction and reduces students' confusion (lecturers design strategies to address challenges); clarifies purpose (this means outlining a vision); keeps students on task (idea must be to arrive in a particular destination or project completion); clarifies expectations and incorporates assessment and feedback (teaching and learning are outcomes-based, tools would be required for that goal); points students to worthy sources (additional information strengthen factual dimension) and reduces uncertainty, surprise, and disappointment (lessons should contain reflection as systemic evaluation) (McKenzie, 2000). Perfect execution of Scaffolding strives for the independence of students who should be inclined to work independently in the near distant future.

Main research question:
> *What are the factors that contribute to challenges encountered by engineering lecturers as they teach vocational subjects at TVET colleges?*

The main research question is constituted by the following objectives which make the variety of information sought in the study and provide a deeper understanding of the challenges:

1. What are the factors that contribute to challenges encountered by engineering lecturers as they teach vocational subjects of TVET colleges?
2. How can challenges encountered by engineering lecturers in selected TVET colleges when teaching vocational subjects be resolved?

METHOD(S)

Research Design

The study was conducted through the optimal use of qualitative research methodology merely because it prioritises obtaining results which are representative of the perceptions, beliefs, or opinions of the participants in relation to the phenomena (Kumar, 2010). For qualitative research methodology to be realized, researchers' presence, full cooperation and participation in the study were required. In this regard, Chivanga & Monyai (2021) assert that researchers' participation provides the opportunity to obtain a comprehensive understanding of the meanings, of the words of the participants in a natural setting. The targeted population of the study would be easier to select when the researcher is physically present. The targeted population of this study included Report 191 engineering lecturers from three TVET colleges who teach vocational subjects. The notable factor is that there could be challenges in teaching Report 191 engineering vocational subjects hence a high failure rate was observed. Approximately a hundred and twenty-three (n=123) were mainly the targeted population for the three vocational institutions. These are the Report 191 engineering lecturers from which data would be extracted through relevant data collection methods. The targeted population of a hundred and twenty-three (n=123) is huge considering that observations and interviews are precisely the data collection planned for the study.

The suitability of purposive sampling stems from the view that it is a technique widely used in qualitative research for the selection of information-rich cases for the most effective use of limited resources (Patton, 2002). The aim of purposive sampling involves the area wherein participants are identified and selected due to their knowledge and experience with a phenomenon of interest (Cresswell & Plano-Clark, 2011). The size of the sample was determined by the volume of data the study collected and the type of the study. Lopez & Whitehead (2013) suggested that the selected number of participants should range between 8 to 15 while Creswell (2007) recommends 3 to 5 participants for a case study, 10 for a phenomenological study and 15 to 20 for a grounded theory study, whereas Morse (1995) suggests 30 to 50 for an ethnographic study. As observations and

interviews were used to collect data in this study, twelve (n=12) observations were conducted while twenty-four (n=24) interviews were conducted out of the twenty-nine (n=29) that accepted invitations to participate.

It was important to apply the two methods of data collection as this would enable the researcher to capture lecturer teaching activities and corroborate interview responses with both data sets interlinked. The observation checklist was constructed based on the same interview schedule questions as a way of data collection triangulation. The first to be conducted was the observational data collection method. With this type of data collection method, researchers observe events, behaviours, interactions and processes directly to obtain an understanding of the concepts (Taherdoost, 2021). Observational data collection assisted in this study to gather direct information; participation occurred in the natural setting; it is flexible and occurred in a natural atmosphere; free from biases; can be generalized as large samples can be covered in the studies; highly reliable and precise data can be achieved (Taherdoost, 2021). During observations, the researcher recorded notes with regard to the manner in which lecturers of Report 191 engineering lecturers presented their lessons. Adding to this, the researcher also observed the manner in which lecturers assessed their students putting more focus on the type of assessment methods.

Magaldi & Berler (2020) perceive the semi-structured interview as an exploratory interview and is based on a guide that is typically focused on the main topic and provides a general pattern. Researchers have an obligation to know when to utilize the semi-structured interviews to extract data from participants. Ruskin, Mashuri, Rasak, Alhabsyi & Syam (2022) state the rationale for using the semi-structured interview which is based on the reflexivity of research when generating data and also when the data feasibility is indistinct. Out of the twenty-nine (n=29) participants targeted for the interviews, only twenty-four (n=24) took part. The involvement in the study by the participants was aimed at answering the main question about challenges encountered by lecturers when teaching the Report 191 engineering subjects, a breeding ground for a high failure rate.

After data collection had been completed, data analysis followed immediately. Dawit (2020) describes data analysis as a process of changing the collected raw data into meaningful facts and ideas to be understood either qualitatively or quantitatively. Data analysis is intended to describe and summarize the data, identify the relationships between variables, compare variables, and identify the difference between variables and forecast outcomes (Dawit, 2020). Content analysis was adopted for the study. Cohen, Manion & Morrison (2007) assert that content analysis is a procedure for the categorization of verbal or behavioural data aiming at its classification, summarization and tabulation. As this study is qualitative in nature, it followed the seven steps analytical process: 1. Formulating research questions to be answered; 2. selecting the sample to be analysed; 3. defining the categories to be applied; 4. outlining the coding process; 5. implementing the coding process; 6. Determining the trustworthiness; and 7. Analysing the results of the coding process (McEwen, 2004). In brief, data analysis developed from the recorded

observations and interviews were later transcribed. It was important for the researcher in this context to immerse himself in the data. Data was summarized and coded according to similar categories of the two data collection methods/instruments. The categories developed into themes which formed the basis for to report write-up of the study.

RESEARCH FINDINGS

The objective of this study was to make an exploration of the factors that contribute to challenges encountered by engineering lecturers as they teach vocational subjects at TVET colleges. Data collection was conducted through observations and semi-structured interviews. Content analysis was used to produce the themes of the study. Participants highlighted those challenges seeking direct intervention to improve performance in their subjects.

Findings whose stature reflects both observational and semi-structured interviews have been displayed in Figure 1 below.
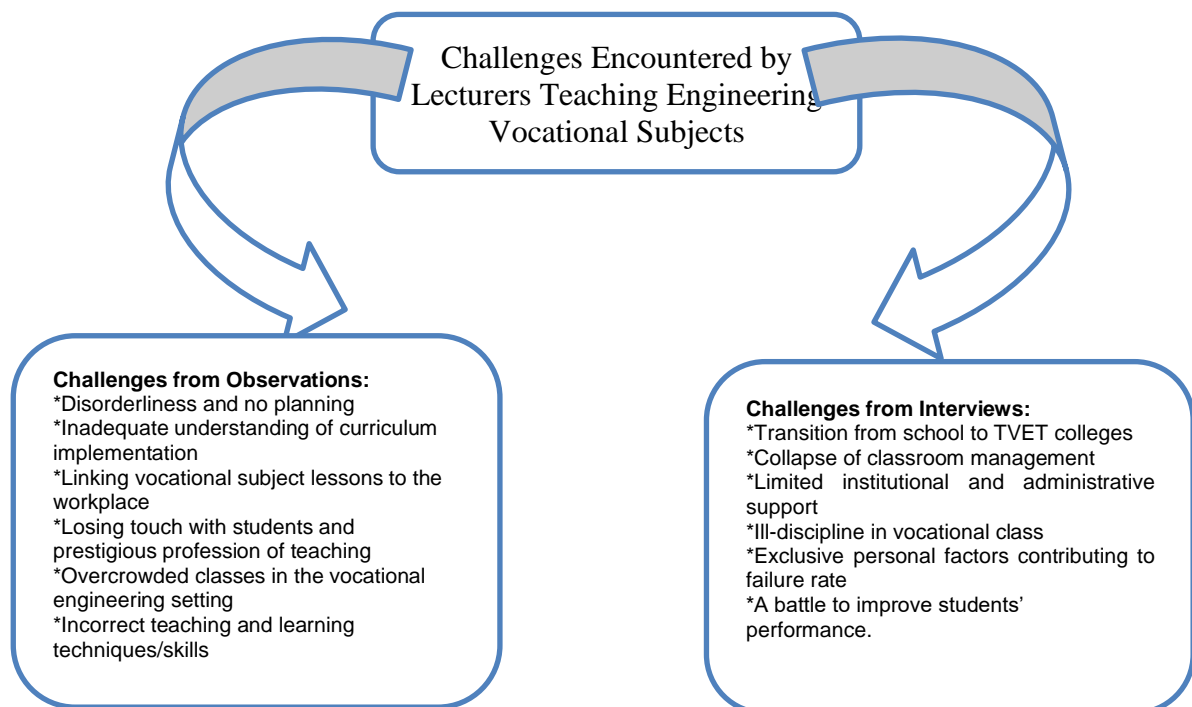
Challenges Encountered by Lecturers Teaching Engineering Vocational Subjects

Challenges from Observations:
*Disorderliness and no planning
*Inadequate understanding of curriculum implementation
*Linking vocational subject lessons to the workplace
*Losing touch with students and prestigious profession of teaching
*Overcrowded classes in the vocational engineering setting
*Incorrect teaching and learning techniques/skills

Challenges from Interviews:
*Transition from school to TVET colleges
*Collapse of classroom management
*Limited institutional and administrative support
*Ill-discipline in vocational class
*Exclusive personal factors contributing to failure rate
*A battle to improve students' performance.

Figure 1.

Challenges emanating from observation and interviews

Challenges emanating from classroom observation

Disorderliness and no planning

Disorderliness in the learning and teaching environment is a disturbance which cannot be tolerated by the authority and laws that govern the education sector. This has an indirect link with situations where lecturers attend to their classes with no lesson plans because, in the eyes of the students, it is easier to observe those who come to class unprepared. The notes below are reflective of what the researcher had observed during the class visit of the participant

OP1SHRND:
> *Two students went out without talking to the lecturer. Drawing tables and chairs were scattered around the class with some in broken state, a sign linked to lesser control. The type of teaching that was observed could be termed chalk and talk. A lesson plan was not available in the class where the lecturer was teaching.* **OP1SHRND**.

Inadequate understanding of curriculum implementation

Curriculum change is bound to occur as it caters for future delivery especially suited for the industry and business. In the vocational classes, lecturers are required to possess the skills and knowledge to implement curricula with fidelity (Wiles & Bondi, 2014) for suitability across all sectors. Participant **OP3MTHG** displayed none of the characteristics above as observed by the researcher in the notes below:

> *Classroom visit included requesting the lecturer to produce a lesson plan which was not readily available. The lecturer instead submitted a printout documents called factsheets which was not even mentioning anything about the TVET sector. The absence of syllabus and lesson plan defeat the very essence of vocational education success.* **OP3MTHG**.

Linking Vocational Subject Lessons to the Workplace

In another study about teaching, Rajagopalan (2019) once stated that when a person imparts information or skills to another, it is common to describe the action as teaching. In the vocational classroom, it will never be sufficient to teach like the common practice. Practical examples are required so that as lecturers teach there should be a link between the theory and practice of the work environment. Most lecturers are unable to provide practicable examples similar to what was observed with participant **OP4MTML**:

> *The lecturer was teaching methods of calculating pressure. On observation, the researcher could tell that something was amiss, and that was linking the lesson to the workplace. The researcher ordered that the lecturer explains where those calculations could be useful in real life situation. The explanation went like: when the TLB arms do not move, the mechanic will investigate the problem, search for leakages, find the leakage and replace the leaking seal. The gauge on the dashboard will show a certain figure which is constant without damaged seal but becomes low when it leaks. After this explanation, students clapped hands for the lecturer as sign of respect, realizing the hidden knowledge and practicality of the subject.* **OP4MTML**.

Losing touch with students and prestigious profession of teaching

Conducting teaching while sitting on the chair opens room for disruptive behaviours which at a later stage may not be controllable. This implies that by sitting down, the lecturer has created a vacuum or concept of proximity that may turn out to create a trend of lecturers losing touch with students. Hans & Hans (2017) described proximity as an element that helps instructors manage what is going on in the classroom. Logic prescribes that obviously when the lecturer is sitting, he or she might possess little control over students. The paragraph below shows what participant **OP8NTSHTNGL** himself did during conducting his lessons.

> *The lecturer was just sited cozily while presenting her lessons first and foremost demanding students to submit the previous day's homework. Out of the eight students in the class, there was only one student who did not write and provided a lame excuse that of not seeing the question paper.* **OP8NTSHTNGL**.

Overcrowded classes in the vocational engineering setting

Issues around overcrowding have been studied before and are caused by the shortage of teachers, a lack of school infrastructure and a high number of poorly resourced no-fee schools (West & Meier, 2020). The method of observation did not allow the researcher to inquire as to why the class was overpopulated with students. The only space available for the participant **OP9SLL** to make movements was nearly 30cm distance from the board.

> *The classroom was congested making lecturer movements difficult. The lecturer reported that lesson plans have been submitted to Senior Lecturer, meaning during the observation, there was no lesson plan available in class.* (**OP9SLL**).

Incorrect teaching and learning techniques/skills

Quality teaching has high degree of students' positive outcomes than poorly executed one. Ayua (2017) asserted that the teacher's real effectiveness involves knowledge of what to teach, how to teach it, when it should be taught, whom is to be taught, why it is taught and even where to teach. Participants **OP10MLDZ**, **OP11MSS** and **OP12MKMBN** teaching strategies were flawed and that was observed as indicated in the paragraphs below:

> *Monotonous engagement between the lecturer and the students in that during question and answer, the lecturer could not individualize question making it possible for students to answer in unison. The room layout was not really appropriate and effective which emanated from the students' congestion, class full to capacity.* (**OP10MLDZ**).

> *Students were frequently asked questions which required the 'true/false' answers, concepts explained but students were not drawn to a textbook, a particular page in order to verify, so that students can also find time to study the information.* (**OP11MSS**).

> *Participation of students in the class was observed, asked to help with calculating the sums that was being solved at the time, but like many other lessons as expected in Mathematics, there was no exercise given to students.* (**OP12MKMBN**).

Challenges emanating from participant interviews

Transition from school to TVET colleges

Public schools offer general subjects at the high school level which are totally different from the subjects offered in TVET colleges. Three of the subjects offered in the TVET colleges out of four are technical and linked to the field of trade chosen by the students. This background has already clouded the argument wherein most lecturers give responses the same way as participant **P10MCK**.

> *Electrical Trade Theory, it is a technical subject when students have never been to industry. So each and every work that you are reading to them is theory and it is difficult for them because that subject is more of practice, is more of technical in the field of Electrical Engineering. And sometimes even when you teach when you look at the students sometimes they could hear you, you know how you explain to them but there after when you give them some work it is difficult to complete whatever the given task so those are the challenges we face as lecturers because at the end of the day you are*

> *sharing to them to make sure that at the end of the day they become the best artisans.* (**P10MCK**).

Collapse of classroom management

The nature of lecturers' duties demands that they should remain up to date with subject area development through communicating with colleagues and other administrators from DHET. Failure to complete and work diligently to face syllabus challenges is merely a reckless mode that extends longer periods of staying at the same level of the programme due to students' high failure. Participant **P15MKEN** has just laid bare proof that he/she is not working hard to keep up with the syllabus and no efforts to ensure relevant information is sought to help students complete their grades on time.

> *We have got new syllabus but when you check the QP mostly with the examiners they don't concentrate on the syllabus they even include some things that are not in the syllabus that is why we have a challenge. You don't know whether you should teach everything in the textbook or concentrate on the syllabus. We try to complain, isn't it when we write reports as to why students failed, it's one of the things we mention but we don't have the right channels to complain about it, we don't know where we stand.* (**P15MKEN**).

Limited institutional and administrative support

Delays in the supply of learning and teaching materials contribute to frustrations for both lecturers and students considering that Report 191 engineering programmes run for three months and write their final examinations. In subjects like Engineering Drawing, it is practically impossible to teach or even learn the subject content without drawing instruments. Participant **P8MPHL** went further to highlight the impact of teaching without resources that first: students may lack money to buy drawing instruments. The use of green boards may tend to cause ill-health due to dust particles when boards are wiped clean.

> *So usually as I will be teaching drawing itself some of the challenges you find that maybe students themselves don't have the instruments, like the T-Squares they have to buy their own instruments so that they can be able to draw to use those instruments. We are still using the chalk to write on the green-board. Some of these challenges causing the dust somewhere somehow you have to be strong over there but the dust itself is one of the challenges.* (**P8MPHL**).

Ill-discipline in a vocational class

When students are given a task as a way to assess understanding of the subject content and some students end up not doing it, such an act borders on ill-discipline. In answering some portion of interview sub-questions, participant **P6MLDZ** showed a cause for concern that students don't perform tasks apportioned to them which is symbolic of ill-discipline. The response showed such behaviour as outlined by participant **P6MLDZ**:

> *The activity, especially homeworks if I give them homework sometimes the following day I go around checking, so if I found out that the student didn't write the homework I just chase them to go outside and finish the homework and I say after that they comeback so that is the challenge again the activity, the students they are failing to write the homeworks.* (**P6MLDZ**).

Exclusive personal factors on technology usage

Orlando and Attard (2015) raised a concern that teaching with technology was not a one-size-fits-all approach as it depends on the types of technology in use at the time and also the curriculum content being taught. While this could be a general concern, participant **P21MKML** held his own which touched base with the manner training on the Moodle application was conducted.

> *For me I can say technological knowledge is a challenge. I only attended one workshop for moodle. How to login to moodle how to access moodle how to put information through moodle. Training was not sufficient because the timeframe was very little. We didn't have enough time to go through each and everything there on moodle so that I can know everything on moodle. What we did we just only did the basics how to login how to put notes how to put tests, how to grade etc. those other things we didn't do such a thing.* (**P21MKML**).

A battle to improve students' performance

It is every stakeholder's aspiration that quality education is provided without limits within the teaching and learning environment. Lack of resource materials in the classroom hampers the quality delivery of vocational education in Report 191 engineering subjects. Due to a lack of resources, lecturers find it difficult to enhance teaching outputs. Mulkeen (2017) concurs that the lack of resources remains the biggest challenge to socio-econopolit transformation in Africa. Even at this juncture, lecturers are still decrying the lack of resources in the vocational education environment. Participant **P4MDU** was blunt about his response into the lack of resources:

If we can get the projectors so that students can see the videos so that they can understand actually what we are talking about because the subject I'm teaching is too practical so it needs virtual learning so that when you explain to the students, those students will have a clue of what we are talking about. (**P4MDU**).

DISCUSSION

Disorderliness must be perceived as a silent revolt by students. This usually happens when students observe that lecturers are ill-prepared for the lesson presentation. Similarly, like classroom disruption; teachers spend lots of energy calming down disorderliness while trying to reach their instructional goals (Espelage & Lopes, 2013). Classroom disruption is one of the main causes of wasted classroom time (Tsouloupas, Carson & Matthews, 2014). Lecturers together with students develop particular rules in class in order to curb disruptions. The inability to adhere to those rules the lecturer works within the framework of justice to punish students for acting in weird circumstances. Due to this kind of student' behaviour, lecturers are likely to suffer permanent exhaustion and weak ill-health. Besides going to class prepared to teach, lecturers have to build good relationships with students so that the process of knowledge transferring can run smoothly (Fakhruddin, 2018). Good relations ultimately bring respect but only when positive teaching prevails.

When a lecturer present documents which seem like advertising posters, there is no doubt that such institution may experience difficulties in the subject area to pass students. Lochner, Conrad & Graham (2015), teachers are central to whether a curriculum is delivered consistently, effectively, and with efficacy to enable the support of student progress and growth. Unfortunately, in this study there is no intention to provide proof and verify the existence of high failure rate but it honestly high failure rate exists and statistics are there to prove. In the curriculum design, instructional suggestions are provided, which involve scripts, lesson plans and assessment options related to a set of objectives (Nevenglosky, Cale & Aguilar, 2019). Policy guidelines in every vocational subject serve to remind lecturers about what to teach and assess, and what students are expected to learn.

Findings as observed from participant **OP4MTML** shows that lecturers do not infuse practical examples in their teaching. In this set up, students will only experiment with their practice during their Work-based Experience (WBE). Practical examples during learning and teaching afford students an opportunity to understand operational process of machines, detecting machine problems and fixing similar problems. Practical examples are a distance away from the WBE since they happen in class and teaching aids could be used for the purpose. Many authors are focusing their studies on work-based learning experiences, such as apprenticeships or school-based VET including on-the-job training

periods which are provided and made into effective learning opportunities in a workstation (Rintala & Nokelainen, 2019). Practical examples are activity based because they emanate from the lesson prepared for that module, for that period and for that day.

As the lecturers teach and walk about, it creates an impression of their presence in the class with feelings of authority. Hans & Hans (2017) put emphasis that walking around the room and standing next to students may eliminate the problem caused quickly. Sitting in the chair, in the same place without moving turns the class into free mode whereby they can do as they want. Teaching and learning environment should be controlled and control as it is known it is a part of management. Speculation is rife and agreeable as Hans & Hans (2017) are content that teachers who are successful with class management are constantly moving.

Normal classroom can accommodate a ratio of 40:1 that is students per teacher (DoE, 2002). Prefabricated mobile classroom standard size ranges at 7x7m. On the day of the visit by the researcher, the prefabricated mobile classroom was carrying nearly 46 students which is above the normal ratio. Adding to the available or present students, the lecturer reported that some students were absent. Overcrowding is a challenge and Hachem & Mayor (2019) attest to the fact that it hinders an efficient teaching and learning process. One way or the other, lecturers are forced to deal with disruptive behaviours due to overcrowding because there is no space to reach the back of the class. It remains with the TVET college to put into their strategic plan and budget for additional prefabricated mobile classes to reduce overcrowding or excessive intake of students. Means of minimizing overcrowding include improved structuring of the classroom, effective discipline strategies and effective planning (West & Meier, 2020).

Contrary to how lecturers were conducting their lessons in class, Xhaferi (2017) demonstrated by listing about 20 points that qualify an effective lecturer including that lecturers should demonstrate excellent knowledge in their subject field; do research in their subject area; relate their research directly to module sessions; relates theory to work-based practice; encourages discussion in the classroom; motivates students to study more; enables students to understand the content of each lesson; is patient with their students; is prepared to explain all points presented; respects students' opinions; is approachable; is enthusiastic about teaching; gives clear guidance when asked for help; starts sessions on time; includes group activities; summarises the main information in the end; gives and accepts examples from their and students' experiences; recognises learner differences; provides feedback and allows time for tasks. This is very doubtful if it can be accomplished by TVET colleges as they stick to traditional teaching.

Concerns raised by participant **P10MCK** represent findings in some other studies about electrical trade theory or industrial electronics. It would be expected that lecturers prepare students with the appropriate hands-on skills to enable the development of future skills (Blayi, Skosana & Khoza, 2022), but that may become an uphill task since most lecturers

do not have practical skills to meet the principle of knowledge transfer. Ehikhamenor (2013) also emphasized that providing students with opportunities to fully engage in practical work is often a challenge to teachers. This was further expanded in the study of Lam & Lidston (2007) that teachers often failed to display the knowledge on the subject required to make the lesson appropriate for students to grasp. The view in this context is opposed to participant **P10MCK**'s viewpoint because teaching and learning does not dictate teaching of people with past knowledge and experience but teach new information students could grab for future use.

Functions as stipulated here are core to the classroom management. Lecturers need to organize the classroom materials; make a choice over rules and procedures; manage strategically and effectively the work of the students as a collaborative mission; commence everything with a good start; expose effectiveness in planning and executing lessons; help students develop and manage cooperative learning groups within the class membership; transform and maintain more conducive student behaviour; empower the entire teaching-learning community with effective communication skills; manage effectively and timely the problematic behaviours as and when they appear to take place or even before and manage with priority the special learner groups (Emmer & Evertson, 2012).

Students' action of non-compliance shows lack of understanding the purpose and role of assessment. During learning and teaching even in vocational classes, lecturers can draw information through assessment and amongst others homework is part of it. Dunn, Morgan, O'Reilly & Parry (2004) added that assessment can be used to clarify teachers' expectations of their students. A major achievement for assessment is that it can support the quality of teaching and learning and is regarded as an essential part of education (Biggs, 2000). Through homework, students are able to refer the work at hand and consult with friends and relatives for broader understanding. Lack of understanding the value of the homework diminishes the essence of self-reliance and sustaining dependency to lecturers.

Participant **P21MKML** greatest concern was the amount of training received on Moodle application which according to him was insufficient. Many other concerns about technology and online teaching have been raised including that majority of ageing teachers were not familiar with operating online teaching devices; parents of students were not cooperating in online teaching; teachers were not entirely free from family jobs during online teaching as they can't fully concentrate on class and due to teachers' inexperience in online teaching therefore, it was hard to manage the online course (Shaheen, & Hoque, 2021). In another study, the author emphasized that without thorough technological training nothing could be done appropriately, hence, the in-service training could fulfil such gaps (Shaheen, & Hoque, 2021). Therefore, TVET colleges are advised to provide retraining on the Moodle application as it was evident that a once off training was not enough.

The participant **P4MDU** went further to outline rationale for providing classroom resource materials that it makes students understand the content through watching videos of relating to topics. Beyond this, Skhephe & Mantlana (2020) echoed similar sentiments that teachers turn out to be frustrated especial during the time to perform practical examinations. This summarizes the fact that there could also be a presence of lack of system to monitor budget approval and procurement processes. Coordinated practice between end users, that is lecturers, or the campuses and administrators must have a link, they must have placed such resources into the strategic planning which later transform into budget. Lecturer must be aware of the fact that they cannot request for resource items not budgeted for because the Public Finance Management Act objects to such unplanned arrangement.

CONCLUSIONS

This study was intended to identify the factors that contributed to challenges encountered by engineering lecturers as they taught vocational subjects in the TVET colleges. Equally important was the fact that identifying factors contributing to challenges formed the basis to seeking solutions. There has been a link between the inability to provide daily lesson plans and the manner in which students conducted themselves in class. Lecturers use lesson plans to guide and regulate the organized framework for educational events (Shaabani, 2011), keeping students focused on content delivery. Campus Management Teams (CMT) at campuses and administrators have got a compelling duty to support lecturers especially when aspects of resource availability come to the fore. Without the necessary support from CMT and administrators, lecturers become frustrated which in turn makes them less productive. It would also be important that the CMT and administrators take lecturers through curriculum implementation which also include aspects of classroom management and appropriate teaching techniques which were found to be lacking. Policy consideration must be factual in that policies should improve students' conduct so that they should know for a fact that ill-discipline can be a punishable offence.

Factors that contribute into challenges encountered by lecturers in teaching Report 191 engineering subjects was initially a small project observed within a campus but later expanded to the three TVET colleges in Limpopo Province. A similar study could be extended to include all the seven TVET colleges in Limpopo Province or sample additional TVET colleges at national level which means an inclusive project for all nine provinces in South Africa. Therefore, as more TVET colleges could be incorporated into a huge study, the methodology and methods will definitely change due to aspects the radius that should be covered during data collection. Like the scaffolding theory as well, it needs revamp to incorporate ICT elements in order to cover recent development of

technology. Economy these days is run through ICT direct activities, therefore scaffolding theory would improve its standing in science when it is incorporated to the ICT demands and development.

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