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Factors Influencing Construction Technology Teachers' Ability to Conduct Simulations Effectively

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Abstract

The efficacy of teaching hands-on skills practical activities requires teachers' willingness to implement technology enhanced pedagogy through the creation of relevant subject simulations. Teachers should be competent with workplace basics in order to prepare and demonstrate construction practical lessons that promote undeniably marketable skills that students can use to contribute to this competitive economy. The goal of this research was to look into the factors that influence Construction Technology teachers' effective teaching when conducting simulations. Purposive sampling was used to identify a total of five (5) teachers to participate in this study. Non-participant observation and semi-structured interviews were also used as a complementary data collection tool. The conceptual framework that guided this study workplace basics. According to the findings of this study, most Construction Technology teachers lack basic workplace skills as well as the ability to maintain effective teaching when conducting simulations. This is due to poorly made artifacts and a failure to use all available tools and equipment. Furthermore, the study discovered that teachers do not always plan for their theory lessons, and the challenge is even more difficult for practical lessons. The study suggests that Construction Technology teachers attend practical skill development training for Curriculum Assessment Policy Statement (CAPS) 2 while also visiting industries, universities, and colleges to gain exposure to the trade environment in order to stay current with technological developments. Most importantly, teachers should engage in ongoing professional development and learn the fundamentals of the workplace basics skills.

Keywords: Construction Technology; Effective teaching and learning; Workplace basics; Occupational and vocational subjects; Construction hands-on skills

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INTRODUCTION

As the educational universe shifts towards a technologically-enhanced pedagogy, teachers of technical subjects still face chronological challenges that continue to hamper their progress, especially in developing countries like South Africa. For instance, on numerous occasions, teachers have received inadequate digital technology teacher professional development programs leading them to display low interest to learn about emerging educational technologies (Olika et al., 2019). In fact, most teachers are still leaning towards a traditional way of teaching where there are face-to-face class activities, written handouts, and outlines. The same could be inferred to construction technology classrooms. In general, the construction technology curriculum, which essentially is that of civil technology in the South

African region focuses on building services rather than trade resulting in the content to be limited to small building projects such as concrete flower pots, benches and pavement bricks (Mtshali & Ramaligela, 2020). This alone limits the students' ability to become competitive with first world countries as they advance in the use of robotics, artificial intelligence and 3D printing in the construction industry. Henceforth, it remains important to enforce innovative strategies to eradicate the pedagogical hurdles facing this region.

We are of a view that simulations are critical to the attainment of practical skills for construction technology students. To the detriment of construction technology, little has been done to understand how critical simulations to practical-based subjects are. According to Camaj et al. (2015) simulations allow people to solve real life problems through illustrative examples. They are often construed as an imitation process of explaining how real world operates. Since their inception in the 16th century, they provide creative, time saving and role specific strategies to cope with big projects from education, socio-economic fraternity, engineering, health, and war. It thus arguable that construction technology teachers deal with competitive skills on daily basis and should always be in par with working strategies to teach students.

In a study by Mtshali (2021), looking at the professional education of civil technology students in Technical Vocational Education Colleges (TVET), he found that teachers do not have a working instructional sequence for simulation, which in turn disadvantages students to acquire relevant competencies. In support, Sephokgole et al. (2021) state that teachers do not take into account the contextual factors such as the student's prior experience, their knowledge and skills capital as well as their personality traits when teaching simulations. We must be mindful that the simulations of construction technology must address local community needs, thus ignoring factors stated by Sephokgole et al. poses a serious pedagogical disjuncture. Also, Nkwanyane et al. (2020) propound that the current curriculum structure of civil engineering courses does not support teachers in identifying labor market competencies, which are at the top of the competency needs hierarchy. Clearly, there is a need for an effective structure to support teachers to run simulations effectively in the long term.

This study examines pedagogical competencies, or lack thereof, that construction technology teachers have when teaching simulation. In fact, simulations in civil technology construction are the hands-on activities that students engage in until they are ready for engineering and artisan training at institutions of higher learning. They are a backbone of the subject as it promotes the acquisition of job-related fundamentals and professional employability. According to Marope et al. (2015), these simulations are part of the strategy of targeting national skills development. Therefore, teachers should carry them out carefully, precisely and with an understanding of the world of work. Hence, Kintu et al. (2019) suggest that teachers still need to enforce rigorous professional development in order to respond appropriately to the current world of work. Consequently, the purpose of this study is to explore factors influencing Construction Technology teachers' ability to conduct simulations effectively. Thusly, this study was driven by the following research question:

RQ: How do Construction Technology teachers conduct simulations effectively? (Non-participant observation)

In the next sections, critical theoretical reviews are done on how simulation is done and where it needs to be improved among other topics.

Literature Review

Conducting hands-on simulations

The effectiveness of teaching hands-on activities on practical skills requires teachers' willingness to implement technology-enhanced pedagogy through the creation of relevant subject simulations that are distinct from those in the PAT document (Isaac & Manto, 2019). As a result, civil technology teachers should be prepared to take responsibility for imparting knowledge through demonstration, and then to effectively direct the didactic process as claimed (Maeko, 2022). In addition, the effectiveness of simulation-based teaching of practical skills in construction is limited, which is why the curricula for curriculum delivery mainly provide a theoretical part instead of practical classes (Mathabatha et al., 2022). The use of appropriate simulations in schools enables the effective teaching of practical skills in construction. According to Mouli et al. (2020), simulation is one of the most important learning tools when it comes to skill acquisition and as a complementary tool for training.

In an ideal world, construction technology teachers should opt to use simulation as a technique to replace real life construction projects that typically elicit significant aspects of treating in a real scenario. Thus, this has the benefit of reducing teachers' safety concerns, improvement of teachers' hands-on skills for construction and permitting repetitive practice, thereby minimizing the margin of error. The level of acquiring more knowledge with high fidelity simulators and simulation-based training in addition to traditional didactic teaching have potential to escalate the teachers' skills in a better way (Ramaboea et al., 2022). Furthermore, simulation-based teaching is effective in improving teachers' ability to interact with tools and equipment on the construction site or in the workshop. Interaction with equipment can vary depending on the annual Construction Technology PAT document and can require different sets of skills.

Teachers' demonstration skills of Construction Hands-on activities

The goal of the Civil Technology subject in high school is to expose students to careers and university courses that produce engineers, technicians, and artisans required in modern society to accelerate the nation's technological development. Preceding literature reveals that technical subjects' teachers for subjects like Construction Technology fail to achieve the aim of technical subjects due to pitiable demonstration of hands-on skills when conducting practical lessons (Mtshali, 2021). Thus, it is critical to create and maintain a list of poor and essential skills in order to influence effective teaching when conducting construction practical activities. Resultantly, technical schools and schools that specialize in occupational and vocational education subjects should concentrate on 'workplace basics' skills to attract various industries for both economic support and skill development for teachers (Blayi et al., 2022). In fact, to embrace globalisation and diversification, all hands-on practical activities performed in schools should adhere to contemporary workplace basics trends (Mtshali, 2021). These include instructional-processing skills, task-preparation skills and demonstration skills.

Certainly, 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, 2020). However, due to a lack of a National Skills Development Strategy (NSD) that focuses on equipping teachers with relevant skills to conduct simulations, teachers in many countries continue to have poor demonstration skills for construction hands-on skills to learners. Also, Marope et al. (2015) mentioned that 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. Conceivably, most countries, particularly African countries, suffer from a lack of NSD due to a poor economic background as well as a lack of skill development centres where they can be confident in demonstrating such skills for the best benefit of the learners.

The need for teachers' hands-on skills development in South African Occupational and Vocational Education Sector

Technology and vocational education graduates entering the world of work should have good expertise in their area of work and have ability to work with latest technologies (Kintu et al., 2019). Unfortunately, the South African occupational and vocational education sector has consistently accumulated teachers with poor work basics and hands-on skills. The lack of practical relevance and responsiveness of occupational and vocational education skills development programmes to the needs of the workplace basics, shared with the problems of insufficient infrastructure, equipment and tools (Eicker et al., 2017) and teachers who are ill-equipped to teach hands-on, practical work (Banjo & Oludele, 2020), pose a huge challenge that hinder effective teaching when teachers are conducting simulations. Thus, influencing Construction Technology teachers' understanding of how to create a more sustainable hands-on skills teaching and learning environment is critical. This is done so that all stakeholders can benefit from the modern era's advancements. Failure to do so is likely to exacerbate the preparedness gap in the country and lower individuals' and companies' global competitiveness (Mtshali & Ramaligela, 2020). Furthermore, such failure may result in the South African occupational and vocational education sector falling further behind and losing its appeal as a provider of skills training. This study enquires into an important, but previously overlooked, area of research that has long warranted more in-depth investigation. The study's value is that it will provide Construction Technology teachers, curriculum developers, policymakers, and industry stakeholders with insights into how to better prepare education universities and their students to cope in a rapidly changing industrial, technological, and workplace environment.

Conceptual Framework

To understand the influence Construction Technology teachers' abilities to conduct simulations effectively, workplace basics must be adhered to. This study approached Carnevale's et al. (1990) "Workplace basics" concept to see how construction technology teachers conduct simulations effectively. According to Carnevale (1990) workplace basics are important throughout the life cycle of a product and the process of service delivery. Although Carnevale (1990) proposed sixteen (16) skills sets for preparing students with hands-on skills, Mtshali (2021) grouped them and changed some based on the argument 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" (Pg. 83). As a

result, Mtshali et al. (2021) developed three themes (skills sets) that captures teaching events for Civil Technology practical lessons, namely (1) Instructional-processing skills, (2) Task-preparation skills, and (3) Demonstration skills.

Initially, Carnevale et al. (1990) claimed that for people to be employed, they should have basic competency skills and influencing skills such as reading, writing, computations, and sharing leadership skills, Mtshali (2021) grouped them and classified them as instructional-processing skills. This was based on the notion that collectively; these skills focus on the ability to read and understand the employer's instructions and share leadership skills to effectively execute projects. Thus, instructional-processing skills was to be understood as early stages of a project or the lesson that is practical in nature, where Construction Technology teachers are given the opportunity to help students with understanding of the objectives of construction hands-on skills which includes, among other things, assigning roles to students or worker who will perform the tasks under the guidance of instructor, teacher or Practical Assessment Task Management Plan (PATMP).

When it comes to task-preparation skills, this included the developmental stages of actual simulation time where groups begin to organise working tools, equipment, and consumables to start project, simulation, or practical activity. In this instance, inspection of tools if they are in good working condition is important, ensuring safe connectivity of tools operating with electricity and wearing of personal protective clothing is essential. The understanding of task preparation skills was inspired by the skills Carnevale's group effective skills such as planning, interpersonal communication, and understanding organizational culture. On close inspection, these skills collectively focus on how individuals' cohort to plan for resources to be used in order to carry out projects effectively. Thus, task-preparation skills are concerned in this study with how tools and equipment are prepared for the conduct of intended construction simulations via Practical Assessment Task (PAT).

Demonstration skills were adapted from adaptability and group effectiveness skills such as teamwork, negotiation, and creative problem solving. This is because these abilities, to some extent, focus on demonstrating that problems have been solved. As such, in this study, demonstration skills refer to teachers' ability to carry out construction hands-on practical tasks, such as how learners handle and use tools and equipment, and how effectively simulations are carried out. As a result, it is critical for Construction Technology teachers to acquire such skills that influencing effective teaching on a regular basis, hence the Occupational and Vocational Education (OVE) sector emphasizes such skills from teachers who conduct practical lessons. The quality of hands-on skills delivery is largely placed on the teacher's ability to transfer content knowledge into hands-on skills (Masha et al., 2021). Therefore, it is vital that the teachers must master the skills mentioned above in order to produce students with the best construction hands-on skills. Because rapid Technology Education curriculum changes, participative management, just-in-time production, and other workplace innovations have created a demand for more flexibility, adaptability, and a higher "base" level of skills from all hands-on skills subject teachers like Construction Technology, basic workplace skills are of interest.

METHOD

In order to explore factors influencing Construction Technology teachers' ability to conduct simulations effectively, this study use a qualitative research approach.

According to Yin (2013) qualitative approach in research is where the researcher attempts to collect rich descriptive data in respect of a particular real-life phenomenon. Consequently, this study was concerned with collecting data and describe how teachers conducted simulations effectively, this was with intention to develop understanding of what is being observed or studied (Yin, 2013). This study used qualitative research with understanding that the data to be collected was going to produce words rather than statistics as data for investigation (Ravitch & Carl, 2016). A single case study design was deemed relevant, as the case were construction technology teachers in Limpopo Province. This research design aided in describing how Construction Technology teachers effectively conduct simulations with the guidance of workplace basics. This study used non-participant observation as a data collection method to better understand this phenomenon. Non-participant observation is a relatively non-obtrusive data collection technique in which a researcher observes the subjects of his study with their knowledge but without actively participating in the situation under investigation (Ärlemalm-Hagsér et al., 2021).

Population and Sampling

In terms of population and sampling, this study included five (5) public secondary schools in South Africa's Limpopo province. Five Construction Technology specialization subject teachers made up the population. This study purposefully sampled five (5) of these teachers from this population because they were the ones who offered the Construction Technology specialization subject and so the researcher believed that they would have the necessary information (Green & Thorogood, 2018).

The scope of the study was limited to grade eleven (11) Construction Technology subject specialization because the researcher discovered that this grade was only subjected to at least three construction simulations as a mandatory hands-on skills lesson and they required special attention in schools. It should be noted that the sampling was guided by the specific trade that was the focus of this study. Only schools that offered Construction Technology programs were included in the sample in order to generate the rich data required to answer the study's question. The activities observed in each school are listed in the Table 1.

Table 1. Practical Task (Simulation) Observed

Participant	Subject Specialization	Task Observed
Teacher A	Construction Technology	Flowerbox formwork.
Teacher B	Construction Technology	Working drawings.
Teacher C	Construction Technology	Concrete mixture
Teacher D	Construction Technology	Flowerpot formwork
Teacher E	Construction Technology	Concrete Garden bench

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, 2014). This involved looking at how (and how well) the Construction Technology teachers conduct simulations. Furthermore, the data collection also focused on what was happening in Construction Technology

subject specialization in accordance to Carnevale's et al. (1990) "workplace basics" themes.

The video data was manually transcribed into narrative story form and then coded under topics, again in accordance with Carnevale's et al. (1990) "workplace basics" themes. Phase 1 was based on instructional-processing skills, and the researcher observed whether or not the teacher(s) explained the practical activities given to learners for conceptualisation, and whether or not learners assigned roles and responsibilities after being given the practical activities. The researcher observed if the teachers had a set-out first-aid kit in case of an emergency in the construction workshop or working site, if learners were monitored to wear protective clothing before beginning activities, and if the physical layout of the workstation was ready to perform hands-on activities in Phase 2. Phase 3 was based on observing the occurrences of demonstration skills involving safe tool and machinery handling, as well as whether the given hands-on activities were completed by the same group of students from start to finish. All of these observations were made during the third term of the 2021 academic year, prior to the final examination for grade eleven (11) Construction Technology.

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

An application for ethical clearance was done, and granted, through the ethics committee of the Faculty of Humanities, in the institution which was affiliated to the authors in 2021. Application for permission to conduct the study in Limpopo Province Department of Basic Education was done and permission granted. Furthermore, a signed consent form by grade eleven Construction Technology teachers. Letters informing parents and consent forms were also provided since learners were part of participants during lesson observations of teachers involved in the research and to the parents of these learners. The aims and objectives and the nature of the study were communicated the aim, as well as the possible application of the findings to participants before the commencement of data collection activities to all stakeholders involved.

Voluntary Participation

No participant was coerced to take part in the study (Babbie, 2013). Participants were free to give their consent initially and later change their minds without being questioned. This was because the participants needed to understand their role within the context of the study and be fully aware of what the research entailed, as previously stated.

Anonymity and Confidentiality

The information gathered was only used for research purposes within the parameters of the study. Anonymity was maintained by informing participants that their names would not appear in the research reports. The researcher gave the participants pseudonyms for reporting purposes, and their faces were hidden in

audio-visual recordings to protect them from potential physical, emotional, intellectual, and social harm (Hughes & Tarrant, 2020). The researcher also assured the participants that the information they provided would not be shared with anyone else and would be safely stored in a storage facility provided by the institution where the researcher was studying (Badiee et al., 2012).

Respect for Participants' Dignity

To ensure respect for the participants' dignity and well-being, the researcher did not judge or discredit their views, inputs, or decisions. Respect was prioritized during interactions with participants. Furthermore, the researcher ensured that the participants' autonomy was protected by not making them feel vulnerable or marginalized. At no time did the researcher lie or deceive the participants (Rubin & Babbie, 2017).

Data Analysis

Generally, qualitative data analysis involves the researcher being able to develop a pattern or theme that best describes the phenomenon observed (Creswell, 2014). In order to analyses qualitative data, this study followed advise by Babbie (2013) to analyse data namely (1) preparing and organizing the data, (2) reducing the data into themes, and (3) representing the data into discussions.

As per Stake (1995) proclamation, data collection and analysis can place concurrently, so is our view. We had no specific point during the research process when data analysis should begin. The researchers ensured that they were familiar with the data by reading, providing detailed descriptions, categorizing data into themes. Data from non-participant observation sessions were analysed using Carnevale's et al. (1990) and Mtshali (2021) notion of "workplace basics". Thusly, the themes were aligned to instructional-processing skills, task-preparation skills, and demonstration skills. Similar practice could be detected from studies such as Sephokgole et al. (2021).

RESULTS AND DISCUSSION

Classroom Observation Findings

A total of five (5) respondents were involved in this study and all of them were Civil Technology (Construction Technology specialization) teachers. All four of the teachers were less than ten (10) years of teaching experience at the sampled schools only one (1) male teacher from a sampled school was over ten (10) years' experience. All of them possessed a professional teaching qualification and this is a common practice in most schools. Part of the reason for this is that only a few teachers of technology subjects do not have them. Respectively, the respondent's demographic information is shown in Table 2.

Table 2. Respondent's Demographic Information

Name	Gender	Age range	No. of years teaching	Qualification	CAPS-2 Attendance
A	Male	30-35	5	B. Education (Honours)	Yes
B	Male	30-35	6	B. Education	Yes
C	Female	25-30	3	B. Education	Yes

Name	Gender	Age range	No. of years teaching	Qualification	CAPS-2 Attendance
D	Male	30-35	1	B. Education	No
E	Male	45-50	21	N. dip & ACE	Yes

Results are presented in accordance to the research question. To respond to the question, data was documented, beginning with instructional processing skills and progressing to task preparations and demonstration skills.

Instructional Processing Skills Theme

This study find out that Construction Technology teachers have poor instructional processing skills for effective teaching when they are conducting construction practical lessons in schools. Teachers were expected to be time cautious, present the topic and the outcomes of the specific lesson, give learners a time to ask question before the commencement of the practical activity and give attention to the lesson taking place. According to Moyer and Milewicz (2002) along with Tanisli (2013) time to ask questions also help the students for questioning the wrong answer, justifying the answer, expanding the correct answer. However, in this study the majority of the participants ignored all that was expected from them. Only teacher E who was observed gathering students and allowing them to ask questions for understanding purposes. Furthermore, teacher E was interviewed, and the teacher also recommended such actions stating that it is for the best interest of the technical subject child to gain understanding then master the relevant hands-on skills.

At least two (2) teachers, which is teacher B and C who practiced ignorance of presentation of the topic of the day. In this case only teacher A, C and E who manage to present their topics of their lessons and also told the students about the lesson outcomes. While teacher B and C showed poor instructional-processing skills because they arrived late to the workshop, the topic was not mentioned to learners. Furthermore, only teacher E who did give learners attention while conducting the construction practical lessons to ensure effective teaching and learning of construction practical lessons. When teachers are considered inattentive, learners tend to attribute it to laziness (Komorowska, 2021). Teacher D completely showed no instructional-processing skills by being late and even more the teacher never gave learners work attention, the teacher ignored learners while performing construction simulations in the workshop. Furthermore, the two oblivious participants (teacher B and C) after the lesson were asked about their presentation of the lesson and their responses showed that technical subjects teachers only rely on the given PAT management plan for instructional planning of hands-on skills activities.

Task Preparation Skills Theme

The main concern in task preparations was layout and workshop readiness. Besides, work induced training programmes as well as course size, format and layout found to be important as well (Jackson, 2015). Furthermore, this study found out that teachers do not follow the Occupational Health and Safety Act, no. 85 of 1993 when preparing construction practical tasks in their workshops for the purpose of safety and health. To validate that, teacher D did not even show any sign that he recognise Occupational Health and Safety Act, no. 85 of 1993 because even the signs that display general information like location of the First-aid kit were not observed.

Not only those such signs but even the mandatory signs were not available in the workshop to ensure safety and security.

Unfortunately, all the Construction Technology teachers who participated in this study lacked a sufficient First-Aid kit. For example teacher A, C, D and E had a scarcity of and spoiled first-aid supplies. However, for personnel protection equipment (PPE) such as safety boots and overalls, not all teachers strictly adhered to this, but knowledge of such was observed only teacher A, C and E ensured all learners adhere to the use of PPE, and some learners were not adequately protected. The availability of personal protective equipment in the workshop for workers need to be checked regularly for safety purposes (Prakash et al., 2020). Moreover, the use of personnel protection equipment in the workplace will bring about improvements in productivity as well as a lower the injury and fatality rates in the workplace (Prakash et al., 2020).

Teacher A, C and D lacked knowledge of good housekeeping and stocktaking hence the tools were left on the floors and the tables after the using them by learners. Only teacher E had a book register that show which tools were taken and track if they were returned to its place. Housekeeping is an integral part of the workplace safety and health in all workplaces and is often associated with the safety standards in a workplace (Bryan, 2022).

Demonstration Skills Theme

According to Nnoli (2021) the importance of demonstration as a teaching approach includes that it follows systematic procedure; it generates curiosity and keen observation ability among learners. However, demonstration of construction hands-on skills expected to be performed by the teachers alone, the teachers and learners groups among others. On the other hand, demonstration can be applied alone in teaching or can be used with other innovative teaching approaches such as project instructional approach or any other good innovative teaching approach to achieve an intended objective (Egbezor & Nnoli, 2015). Teacher A, B, C and D faced difficulties in ensuring the effectiveness of their construction practical lessons in terms of demonstration skills. The four teachers were observed stationed at their tables rather than moving around and assisting where needed. Only teacher E who demonstrated a complete concrete garden bench and was also observed moving around and assisting learners. Therefore, this demonstrated that the teachers lacked construction hands-on skills, as most were not observed demonstrating before giving learners simulations. Furthermore, poor classroom management skills were observed, as a result of which teacher D was not able to maintain discipline in the workshop, with learners moving in and out as they pleased. At the very least, all of the teachers were able to create a PAT management plan that will assist them in completing the PAT syllabus.

Discussions

The findings of the non-participant observation revealed that Construction Technology teachers struggled to conduct simulations effectively due to shortcomings in executing instructional processing skills, task preparation skills, and demonstration skills. For instance, construction technology teachers displayed poor instructional processing skills for effective teaching when conducting construction practical lessons in schools. Teachers were expected to be cautious about contact time - lesson

presentations must begin with a thorough explanation of the topic and the lesson outcomes of the specific lesson, followed by questions for clarification from the students before they begin with their construction practical activities (Wang & Ryan, 2020). It was not surprising that construction technology teachers relied solely on the PAT document and the PAT management plan to assign learners practical tasks for the day. Maeko (2022) claimed that civil technology teachers focuses more on theory than practicals to the detriment of students psychomotor skills – which explains why students had no opportunity to ask persuasive questions before engaging with simulations.

When it comes to Task-preparation skills, Construction Technology teachers were observed practicing teaching in an environment where occupational health and safety were unconsciously ignored. It seems teachers and their school managers do not see workplace basics as a good effect to sustain and maintain effective teaching and learning when teachers conduct simulations. This was proof by the workshop layout in which it was hard to see first aid kits in the place of work. Where they were first aid kit, they were not up inspected regularly. To a greater extent, good housekeeping was also poorly demonstrated. Moreover, teacher D did not show any protective mandatory signs in his workshop, which validate that the teacher did not recognise Occupational Health and Safety standard of the workshop and basics of the workplace.

In the concern of demonstration by teachers, the researcher was expecting to observe Construction Technology teachers demonstrating construction hands-on skills for students. However, this study did not find what was expected from the participants since the majority of teachers (Teacher A, B, C and D) faced difficulties in ensuring the effectiveness of their construction practical lessons in terms of demonstration skills. The four teachers were observed stationed at their tables rather than moving around and assisting where needed. Only teacher E who demonstrated a complete concrete garden bench and was also observed moving around and assisting learners. Therefore, this demonstrated that the teachers lacked construction hands-on skills, as most were not observed demonstrating before giving learners simulations. Furthermore, poor classroom management skills were observed, as a result of which teacher D was not able to maintain discipline in the workshop, with learners moving in and out as they pleased. At the very least, all of the teachers were able to create a PAT management plan that will assist them in completing the PAT syllabus.

CONCLUSION

By dissecting the current achievements and deficits of schools that provide vocational education to respond to modernity, this study offers the greatest utility for exploring the influence of construction technology teachers on their ability to effectively conduct simulations. This study concludes that construction technology teachers need closer and rigorous professional development to facilitate simulation effectively. This may extent to all technical subjects in schools, colleges, and universities. But, also, this study assists industries to be aware of the patterns that should be followed as a quality assurance strategy to hands-on skills.

RECOMMENDATION

We thus recommend that workplace basics should be a key framework to assist in capturing skills as one engages in practical activities. This will have a good

influence on the effective teaching of building and manufacturing practice lessons - which has so far received little attention in research. The research is significant in several ways. For starters, it provides insights for the Department of Basic Education (DBE) on issues requiring immediate attention at the secondary school level, while also providing a holistic view of where the priorities lie in terms of the demand for, and enhancement of, skills in Civil Technology. Secondly, the study helps to raise awareness of teachers' abilities to teach hands-on practical lessons effectively even when they lack formal qualifications. Finally, the study demonstrates how current Civil Technology teacher training is disconnected from the larger vision of the fourth industrial revolution, and how practical activities continue to repeat from previous years. The recommendation is that each technical or secondary school have a dedicated team that will work with Sector Education and Training Authorities (SETAs) to plan timely and in-demand hands-on training activities, as well as encourage the use of appropriate technologies to solve contemporary problems in the built environment.

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Declaration of interests

The researchers declare no conflict of interests.

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