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Equipping Civil Technology Teachers with Hands-On Skills and Educational Resources for Effective Teaching of Practical Lessons

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ABSTRACT

Continuous professional development for teachers will always be prioritized, especially in cases where there are obvious and conspicuous gaps in their subject-matter expertise and when they handle practical skills exercises with inadequate planning and delivery. Hence, this study explores the effects of equipping Civil Technology teachers with hands-on skills and provision of educational resources for effective teaching of practical lessons. This study purposefully sampled nine (09) Civil Technology teachers from Ekurhuleni East, Gauteng province of South Africa. This study was hinged on Stronge's qualities of effective teachers as its framework. This study adapted a mixed method design where closed-ended questionnaires and semi-structured interviews were considered relevant data collection instrument and sources. A sequential explanatory design was used to analyze the collected data. The findings reveal that even though teachers get continuous hands-on skills training from the Gauteng Department of Education (GDE) annually, the trainings are often too generic and do not adequately boost teachers with confidence to teach specific skills (i.e., construction and plumbing) to learners. As a result, Civil Technology teachers could not actualize their continuous professional development training as an element of learning to become innovative skills teachers. The survey found that while certain Ekurhuleni East schools have instructional tools, some of the teachers were not trained to use them, which made it difficult to effectively teach practical lessons in Civil Technology. Therefore, this study recommended that the Gauteng Department of Education should focus on discipline specific instructional strategies that will promote innovation in skills-based activities in Civil Technology.

KEYWORDS

Civil technology teachers; hands-on skills; educational resources; effective teaching; technology education.

INTRODUCTION

Modern education would not be complete without a focus on technology, and training technical subject teachers in these areas is essential to creating innovative educators. Nevertheless, Hımmetoglu et al. (2020) emphasizes how education helps teachers develop innovative skills so that their instruction is in line with Industry 4.0. However, the fields of technology and vocational education (TVE) have long struggled to produce teachers with practical experience necessary for the subjects in which they specialize because they deal with the problem of teachers who lack the practical skills necessary for their learners to graduate with an overabundance of skills. Wilson et al. (2001), contends that teachers who have received the necessary training and preparation have a greater success rate with learners than those who have not. As a result, a teacher's pedagogical expertise benefits learners' performance both inside and outside of the classroom (Mudzana, 2015). Furthermore, this is not ideal for a faltering economy like South Africa's, where a sizable portion of highly skilled workers are getting close to retirement and will soon leave the engineering field. Most vocational opportunities in both domestic and economic employment in South Africa is dependent on foreign workers (Albert & Mdumazi, 2017).

According to these researchers, teachers lack strategies to teach psychomotor skills and are unable to motivate students to pursue a career in engineering after leaving school. Also, Masha et al. (2021) finds that TVE teachers have not fully conceptualized the advanced science of teaching and learning, which creates further challenges in developing educational solutions that challenge systematic competency trajectories. On this basis, there is a need to equip civil technology teachers with practical skills and educational resources to effectively teach practical lessons. Of course, the apparent disparity between training institutions such as schools and industry pose a major threat to the TVE skilled labor economy (Mhlongo, Khoza & Skosana, 2023). Teacher training institutions have also failed to form active partnerships with industry in training TVE teachers (Mtshali & Msimango, 2023). The disadvantage is that teachers focus more on theory because they learned about it during their teacher training times (Alber & Dumazi, 2017). Ramaligela (2021) provides an interesting insight into TVE teacher preparedness. She assumes that teachers have yet to make the connection between content knowledge and their teaching practices, which will strengthen their ability to teach practical lessons. Gumbo (2020) has long held this view, stating that technology teachers are unable to update their pedagogical content knowledge. It is these claims that make this study compelling. The role of a teacher is important in the world of skill development, and if there are gaps in their ability to impart practical skills, important majors must be taken.

This study focuses on discussions about equipping teachers in the field of civil technology and the provision of educational resources. This is because less attention is being paid to this issue to give space to the role of indigenous games in education. While this contribution is of paramount importance in promoting a progressive discourse in technology education, the ability of civil technology teachers to mobilize pedagogical capital remains challenging. In the

following section, this paper discusses construction technology, a discipline that contributes to skills development from secondary school onwards. Thus, Mokhothu (2019) described civil technology as a subject that focuses on concepts and principles in the built environment and is technology oriented. Civil technology is a technical subject used in secondary schools to teach practical skills and the application of basic scientific principles (Mtshali, 2020). It follows that civil engineering teachers must have the necessary practical skills and educational resources to teach this practical subject. The civil engineering teacher's role in the learning process should be not only to teach to impart or transform knowledge, but also to develop their practical skills to enable effective teaching of practical lessons in an integrated manner (Mtshali & Msimango, 2023). Therefore, for the successful production of qualified and technology-oriented workforce, the role of the teacher is important, especially through the effective teaching of relevant practical skills from the secondary level onwards.

Noteworthy is the work of Ifinedo et al. (2020) who claim that professional development helps teachers integrate technology specifically for curriculum delivery. Ifinedo et al. (2020) argues that the teacher's practical skills and educational resources are extremely important for effectively teaching practical lessons in TVE. According to Donkor (2011), teaching practical skills in a traditional educational setting requires the use of specific instructions that allow students to follow the process and then replicate the skill. Therefore, teachers need to be well-equipped to transfer skills to learners after being exposed to various training resources. It is unfortunate that studies such as assessing learner acceptance and satisfaction with video-based teaching tools for teaching practical skills are being conducted remotely. assumes that teachers can teach. In fact, reading these posts, you get the feeling that teachers, because they are the primary conduit of knowledge for learners, know how to teach using different media. Isaac and Manto (2019) emphasize that civil engineering teachers lack understanding of the practical environment and do not always have opportunities to use this environment to create innovative practical activities. Furthermore, Mtshali and Ramaligela (2022) posit that even the assessment strategies used by Civil Technology teachers prove that they need pedagogical and educational resources assistance. Based on those grounds, a study of this nature is timely.

Purpose and Research Questions

Purpose

The purpose of this study is to improve the teaching of practical lessons in Civil Technology by equipping teachers with hands-on skills and educational resources.

Research questions

The specific research questions are:

1. What is the correlation between Civil Technology teachers' hands-on skill development and educational resource availability/utilization? (Close-ended questionnaire)
2. What are the consequences for shortage of Civil Technology educational resources? (Interviews)

LITERATURE REVIEW

Literature in modern education is the product of a significant pool of current scholarly work presented in a variety of formats such as articles, book chapters, dissertations, and so on. This allows academics to uncover knowledge gaps that may aid in the development of education field. However, this study's literature review will focus on these three points of focus:

I. Enhancing teaching quality through improved practical skills for Civil Technology teachers
II. Teacher effectiveness in the Civil Technology workshop
III. The impact of educational resources on teaching effectiveness.

Enhancing Teaching Quality Through Improved Practical Skills For Civil Technology Teachers

As advocated by Stronge (2018), training and development have always been the driving force for improving the quality of teachers in delivering practical lessons effectively. According to Stronge (2018) and Mtshali and Msimango (2023), there is general agreement that practical teacher competency development programs in civil engineering can help teachers acquire qualities for effective teaching and learning of practical lessons in the classroom. The employer's teacher training and development programs represent a genuine effort to provide teachers with the opportunity to become familiar with the trades and skills of the construction industry. As a result, structural engineering teachers not only acquire subject-specific practical skills, but also knowledge of how to use subject-relevant teaching materials. Nevertheless, Morgan and Jacobs (2020) mentioned in their study “Opportunities and Challenges for Machine Learning in Materials Science” that the influence of teaching and learning resources is self-reinforcing and the use of teaching resources then becomes more impressive.

With the expansion of school education system, technology and engineering education need talented and well-trained workforce to maintain the quality of effective teaching of practical lessons in schools. Skills development plays an incredibly vital role as technology advances, organizational effectiveness, and people's experiences in their jobs (Ifinedo et al., 2020). This means that teachers with such significant educational practice can benefit from many skills and knowledge in subject teaching. By implementing these teacher development programs, civil engineering teachers can improve their practical skills and ultimately improve the quality of education they provide to students in the field of civil engineering. By actively engaging in hands-on activities, teachers can also better understand the challenges students face and develop effective teaching strategies. Development programs increase teachers' confidence by allowing them to interact with and identify students with learning problems (Naibaho, 2022). This can lead to a better understanding of their students' learning levels.

Teacher Effectiveness in The Civil Technology Workshop

When it comes to ensuring that learners acquire Civil Technology skills at the end of each practical lesson, the teacher is the most important teaching resource in the workshop. This study places great emphasis on teacher effectiveness to improve civil engineering teachers' practical skills and understanding of how to effectively use the available educational resources. Although

various conceptualizations of teacher effectiveness have been proposed over the years (Darling-Hammond, 2017). We still do not have a consensus definition. Nevertheless, teacher effectiveness has been the focus of educational impact research, including measures of effective teaching programs. Although Patricia at al. (2023) defined, among other things, teacher effectiveness in terms of student learning growth, typically measured by a standardized assessment of students defined by student growth percentile and value-added metrics. They save more money for retirement and get in their teens less often children. However, such a definition leaves a gap as it does not focus on the skills, knowledge, and competencies of the teacher in teaching and learning practical lessons in the workshop. However, civil engineering teachers are expected to demonstrate skills and knowledge to the learners and evaluate the simulations conducted (Chang et al., 2022). Not just demonstrating skills, the role of an effective teacher in the workshop is to ensure that both the teacher and the learners follow all safety precautions. Therefore, for safety reasons, teachers are required to understand and apply the guidelines of the Occupational Health and Safety Act (OHS Act No. 85 of 1993) in the construction engineering workshop. Additionally, the role of an effective teacher in the construction engineering workshop is to facilitate the practical teaching of the day. Therefore, teachers as facilitators must address factors related to the innovation, the innovation recipients, and the context that may hinder or promote implementation. The teacher is aware as a facilitator and must use active learning methods, active learning teaching techniques and projects. A teacher based on learning will be aware of the role of the facilitator and the teacher will improve the facilitator's qualities as a teacher (Jagtap, 2016). In this study, the author recognizes civil engineering teachers as facilitators because they need to moderate their practical teaching to ensure that all learners get a chance to participate in the lesson. The author noted poor facilitation skills among participants in this study, where learners were not instructed on how to use the correct tools while others did not participate. However, this deprives students of the opportunity to demonstrate their knowledge and skills and could have an extremely negative impact on students' motivation and career prospects (Yangben & Seniwoliba, 2014).

The Impact of Educational Resources On Teaching Effectiveness

Previous research shows that adequate levels of basic school resources can significantly improve student achievement (Hanushek, 1995; Benbow, Mizrachi, Oliver, & Said-Moshiro, 2007). Thus, teaching and learning aids improve retention, which makes learning more lasting (Chepkwesis, 2015). However, in technical and vocational education, academic resources such as tools and equipment are the most important components that influence effective teaching of practical skills in the workshop. Therefore, teaching practical civil engineering skills requires the use of precise pedagogical resources and instructions that allow students to follow the process and subsequently replicate the skills, whether in a traditional educational setting. Additionally, by incorporating simulations, real-world examples, and other engaging materials, teachers can make the teaching and learning of practical skills more accessible and enjoyable for students

(Ravichandran & Mahapatra, 2023). Even in a typical conventional workshop, a teacher gives such instructions on how to use the equipment and tools in workshops using the appropriate materials and equipment (Kim et al., 2019). The teaching materials help teachers and learners alike gain information, practical experience, and skills in the art of construction. However, in terms of learning practical skills, learners begin by conducting simulations using either printed drawings of step-by-step methods or video-based hands-on training with specific tools and materials. The students rely on practical lessons with equipment, tools, and materials from the workshop. However, in terms of practical skill learning, learners begin by completing simulations utilizing either print-based drawings of step-by-step methods or video-based practical training with specific tools and materials. The students access the practical lessons using equipment, tools and materials from the workshop. The availability of the subject relevant educational resources assists teachers to conduct effective teaching in the classroom and the workshop Civil Technology practical skills are finally consolidated through hands-on activities in workshops during face-to-face sessions at learning facilities supervised by an instructor. This study has noted that educational resources make a significant contribution to teacher professional development by providing training materials, lesson plans, assessment tools, and best practice guides. Teachers can improve their teaching strategies and keep updated on educational trends by constantly updating their knowledge and abilities using these tools (Ramírez-Montoya et al., 2021).

CONCEPTUAL FRAMEWORK

To explore the equipment of Civil Technology teachers with hands-on skills and educational resources for effective teaching of practical lessons, this study used Stronge (2018) qualities of effective teachers. According to Stronge (2018) qualities of effective teachers pivot on the teacher's effectiveness in delivering the subject matter and imprints the knowledge on their students. To achieve this, Stronge (2018) discusses different characteristics that contribute to effective teaching and learning in any education system. Thus, includes professional knowledge, instructional planning, instructional delivery, assessment, learning environment and professionalism, all rolled into one-the teacher. It is therefore our belief that a teacher should be equipped with these skills before they engage the learner in any instructional activity. For this study, only two (2) characteristics were adopted, namely, instructional delivery and learning environment. Instructional delivery is the key to teaching and learning of Civil Technology practical lessons in schools. Furthermore, instructional delivery also involves the way teachers demonstrate or teach practical lessons, engage students, facilitate, and evaluate hands-on activities in a Civil Technology workshop. This means that a teacher needs to master subject practical knowledge and skills and relate it to industry and community demands. Yet, Gumbo (2020) contends that technical subject teachers are still lacking instructional delivery skills for practical activities. There are gaps in how technical subject teachers teach practical lessons, and studies into this have been equivocal, particularly in the context of civil technology. As a result,

this study recommends instructional delivery based on Stronge's (2018) qualities of an effective teacher as a guideline and raises awareness of how Civil Technology teachers can conduct practical lessons effectively. Therefore, emphasize that Civil Technology subject specializations teachers should be fully involved when conducting simulations in schools; hence the demonstration of hands-on skills and effective facilitation during practical lessons are essential for effective teaching. Learning environments have good influence for effective teaching and learning of practical lessons. Hence, Cayubit (2022), mentioned that a conducive learning environment can significantly enhance students' engagement, motivation, and overall learning experience. Regardless of how well the teaching and learning environment is equipped with instructional resources, the purpose of this study is to encourage training for Civil Technology teachers on how to utilize and maintain the tools and equipment accessible in their workshops to avoid delays in teaching and learning. Furthermore, this study seeks to clarify that for conducive teaching and learning environment an appropriate student-teacher ratio also promotes effective teaching, fostering a more collaborative and engaging learning environment. Hence, several studies have revealed that most technical subjects are congested and that affect effective teaching of practical lessons and pose a risk in the workshop. Nevertheless, the Civil Technology workshop is expected to be well furnished with all relevant components of the subject specializations' educational resources. Educational resources in the workshop are valuable because they train and develop both teachers and learners to be experts of Civil Technology craftsmanship. Furthermore, materials, tools and equipment availability in the learning environment are considered a key component for effective teaching of practical lessons.

METHODOLOGY

In this study, a mixed methods research approach was employed. However, mixed methods research approach involves collecting and integrating quantitative and qualitative data in a single project and therefore may result in a more comprehensive understanding of the phenomenon under investigation (Leavy, 2022). Furthermore, this kind of research design is recognized as a problem-centered approach to research in which methods and theories are used instrumentally, based on their applicability to the present study. Thus, this study collected data through closed-ended questionnaire and semi-structured interviews as data collection instrument. Data for this study were acquired by online survey data collection tool and face-to-face semi-structured interviews. The collected data was kept confidential and private. Furthermore, pseudonyms were utilized to shield the identities of the participated Civil Technology teachers. Nine (09) Civil Technology teachers from Ekurhuleni East, Gauteng province of South Africa was purposefully selected. The purposive sampling allowed the researchers to make a "judgment" and select criteria to identify the most appropriate participants (Mafhungo, 2022). Therefore, Civil Technology teachers were purposefully selected

as the information-rich participants hence they are already in the field of education. It is worth mentioning the participants' profile; please find table 1 bellow.

Table 1.

Participants' profile

Teacher(s)	Subject specialization(s)	Highest qualification in Technology Education	School setting	Teaching experience in years
Teacher A	Construction	B. Education	Township	06
Teacher B	Construction	B. Ed (Hons)	Sub-urban	08
Teacher C	Civil Services	B. Education	Township	04
Teacher D	Construction	ACE (Advanced Certificate in Education)	Township	21
Teacher E	Woodworking	B. Education	Sub-urban	26
Teacher F	Woodworking	B. Education	Township	13
Teacher G	Woodworking	Med (master's in education)	Township	07
Teacher H	Woodworking	B. Education	Township	08
Teacher I	Woodworking	B. Ed (Hons)	Township	05

Participants were chosen based on their qualifications, Civil Technology subject specialization expertise, and teaching experience of three years or more. However, two participants (Teacher B and Teacher E) are from the same school because their school have two Civil Technology subject specializations which is woodworking and construction. The sample size of nine participants from various schools was chosen to collect information from competent and experienced teacher participants. Furthermore, participants were asked to offer their experiences from a variety of contexts (township and suburban) to gain a better understanding of skill development programs for Civil Technology teachers.

Data Analysis

Alem (2020), described data analysis as a process of changing the gathered raw data into useful facts and concepts that can be interpreted either qualitatively or quantitatively. Since the data of this study is complementary in nature, sequential explanatory design was used to analyze the collected data. According to Almeida (2018), sequential explanatory design is a mixed method research design used to sequentially integrate quantitative and qualitative data in two distinct phases. Furthermore, this approach typically begins with the collection and analysis of quantitative data, followed by the collection and analysis of qualitative data to explain, or further explore the quantitative findings. As such, researchers initially focused on collecting and analyzing data through structured survey form where they carefully captured quantifiable data to address the concern of correlation between Civil Technology teachers' hands-on skill

development and educational resource availability/utilization. Also, following the quantitative phase, on the second phase the researchers collected and analyzed qualitative data to provide a deeper understanding, context, and explanation for the quantitative results obtained from the first phase. However, the researchers collected qualitative nature of data using semi-structured interviews seeking to elucidate the underlying implications suggested by the quantitative findings. The last step involved integrating the quantitative and qualitative findings to provide a comprehensive, enriched understanding of the research problem. This is where the researchers carefully integrated then interpreted and contrasted the available data. In the end, the researchers wrote down all their findings, that is, documenting what was discovered in the data in relation to the research questions.

Validity and Reliability of the Study

Validity

According to Sürücü and Maslakçi (2020), validity in research refers to the extent to which a study accurately measures or reflects the concept or phenomenon it claims to measure. Therefore, the validity of this study can be seen in various aspects. Firstly, the researchers used a well-established data collection tool; that is online survey research form (open-ended questionnaires) and semi-structured interviews to collect data information-rich from Civil Technology teachers. Furthermore, the validity of the questionnaire instrument in this study was ensured by using a peer reviewer who was provided with valuable input on the kind of questions to be asked (Creswell, 2021). As a result, the researchers opted to have their data gathering techniques peer reviewed by another lecturer from another university.

Reliability

Reliability is defined as the accuracy and repeatability of a measurement made with a scale (Isik et al., 2020). However, reliability of the study is evident through its methodology and data analysis. The researchers ensured reliability by employing standardized procedures for data collection and analysis. After data was analyzed through sequential explanatory design conducted and they also did inter-rater reliability checks to ensure consistency in scoring and interpretation of results. Moreover, the study had a sufficient sample of well-informed Civil Technology teachers with experience, which enhances the reliability of the findings.

FINDINGS

Research Question One (RQ1): What is the correlation between Civil Technology teachers' hands-on skill development and educational resource availability/utilization? (Close-ended questionnaire)

As indicated earlier, this research question was responded to via closed-ended questionnaire using an online survey form, Civil Technology teachers reveal the following findings, see table 2.

Table 2.

Research Question One (RQ1) findings:

Concern(s)	Agree	Disagree	Not sure	Other comment(s)
1. Are the ongoing courses for skill development beneficial to your practical lessons?	100%	-	-	-
2. Does your workshop setting allow you to put your newly acquired hands-on skills into practice?	77.7%	22.3%	-	22.3% "my workshop is crowded by old and not working woodworking machines"
3. Do you believe all the training activities equip you with innovative strategies to design practical lessons that are responsive to industrial needs?	85%	15%	-	-
4. Do the accessible educational resources in your workshop effect the skills learnt from the works?	82%	13%	-	-
5. Are the instructional resources used at the training institution available at your workshop?	78%	22%	-	-
6. Is the provision or distribution of educational resources in accordance with the completion date of your practical activities?	77.7%	22.23%	-	-

Research Question Two (RQ2): What are the consequences for shortage of Civil Technology educational resources? (Semi-structured interviews).

As indicated earlier, this research question was responded to face using semi-structured interview methods. However, those interviews were scheduled for face-to-face sessions with Civil Technology teachers reveal the following findings.

Teacher A : "*such incidents cause a disturbance of PAT management plan and that results, unnecessary workload for both us and the students"*

Teacher B : *"The shortage of Civil Technology related educational resources cause a delay of the practical lessons in schools and that add a burden of their workload and they fall behind the subject Annual Teaching Plan (ATP)"*

Teacher C : *"Civil Services subject require a thorough practice of hands-on skills but in absentia of educational resources this subject as a teacher I suffer from disruption for development of hands-on skills and also effective teaching and learning of plumbing practical lessons"*

Teacher D : "*that disturb my practical assessment plan and I end up not having quality time for teaching these practical lessons, and it is not fair for my students because they get under pressure"*

Teacher E : *"Eish, that disturb my confidence because I end up not getting enough time to practice what I learned during teacher development session, before I teach my kids those skills"*

Teacher F : *"This disturb everything, because I end up not having quality time for revision of the final exam because on that time I must deal with practical lessons"*

Teacher G : *"That cause a lot of strain to myself and my learners because of that and end up doing practical activities that we are not happy with"*

Teacher H : *"that rob me a quality time of conducting simulations with lower grades because I must focus on grade 12 PAT because I get under pressure due to small time remaining to complete PAT"*

Teacher I : *"that deprive me and my learners' time to practice our woodworking hands-on skills due that delay of the educational resource that are relevant to PAT of the year"*

DISCUSSION

In reference to the above findings, the results of this study support the suggestions of Kerkhof and Cloud (2020) that teachers desire and value practicing globally competent teaching but need practical guidance to implement it in the classroom. Therefore, the teaching and learning environment in our country, South Africa, has not been ignored. An ongoing teacher development process needs to be initiated to support adaptive technical teachers in Ekurhuleni, South Africa. Regarding the data collected above, it was noted that annual practical skills workshops are planned for all technical teachers from Ekurhuleni, South Africa. However, during these workshops, teachers are divided according to their subject specialization to make it easier for their mentors to guide them accordingly. Furthermore, this study found that 100% of participants believe that organized skills development programs are valuable to them as it improves their skills and confidence when they must take practical classes for their various specializations in school. According to van Tartwijk et al. (2017), teachers need to continually develop their skills to adapt effectively to educational changes. This ensures that they can meet the diverse needs of their students and provide relevant and engaging lessons. Additionally, this study confirms that most teachers and schools specializing in construction technology receive educational resources that support their practical teaching. Unfortunately, only 77.7% of participants are satisfied with their workshop environment, while 22.3% cry due to the overload of their workplaces with old and no longer functional machines and tools. However, such work environments can hinder effective teaching and lead to accidents in the workshop. Only 85% of participants believe that their skills training provides them with innovative strategies for designing their practical activities that are tailored to the needs of the industry. In this context, Patricia et. al (2023) claims that teachers in technology education lack creative pedagogy when tackling practical activities. Furthermore, this study also confirms that there is still a need for

developing teachers' creative and innovative skills. Furthermore, this study confirms the continued need for teachers to develop creative and innovative skills. At least 70% of participants have accessible educational resources relevant to practicing what they have learned and helping them complete and adhere to the PAT management plan. In fact, scholars such as Isaac and Manto (2019) have predicted that unless teachers are provided with hands-on activities, tools and equipment, and supplies, there will be more cases of under-education. In this study the findings emerge, and they differ from what those scholars predicted because this study found that majority of schools at Ekurhuleni are given a chance to access the educational resources in their schools. Also, this study deemed it necessary to inquire teachers about the consequences of shortage of Civil Technology educational resources in their schools. However, this study discovered that all the participants face a common challenge: a burden of excess work, which leads to incompetent simulations of PAT. As Munishi (2016), engages on factors contributing to lack of employable skills among technical and vocational education (TVET) graduates in Tanzania. The researcher identified a substantial correlation between a lack of employability skills and a lack of educational resources. However, this study discovered that technical subject teachers, such as Civil Technology, receive skill development chances, but only a handful still lack access to instructional resources. In line with this thought, it was crucial to understand teachers' views on the consequences of not having sufficient educational resources for Civil Technology to insight the reason behind that and provide recommendations to resolve the matter. Thus, the participants gave a variety of unpleasant responses that may lead to poor results due to absentia of educational resources that influence effective teaching and learning. The shortage of educational resources does not only result in unnecessary overloaded work, but it also disturbs the correlation between skills development and instructional delivery. Hence, some of the participants do not get enough time to practice mastering what they have learned from the workshop. Furthermore, participants mentioned that if the is a shortage of instructional material that is relevant to Civil Technology practical lessons, they end up challenged by a limited time to conduct practical lessons against the time for the revision of the National Senior Certificate (NSC) year-end final examination. In addition, Adukaite et al. (2017), mentioned that the lack of adequate resources can lead to a suboptimal learning experience, limiting students' ability to grasp complex concepts and hinder their overall academic and professional development. However, the findings from this study reveal that what Adukaite et. al (2016) highlighted is still persistent and affects effective teaching and learning of Civil Technology practical skills. Insufficient resources also affect hands-on learning experiences, a crucial aspect of technology education field. Also, both teachers and students need practical training opportunities to understand and apply theoretical concepts effectively. Thus, limited access to equipment and poor maintenance workshop facilities hinders their ability to gain hands-on experience and develop necessary skills.

CONCLUSION AND RECOMMENDATIONS

Given the circumstances, the study's results showed that the Gauteng Province Department of Education (GPDE) tries to give Civil Technology teachers practical experience related to their areas of expertise. But Bragg et al. (2021), suggest that improvements in teaching methods may result from giving educators in schools opportunities to further their professional development. The researchers are further supported by all the study's findings and analyses, which give teachers the chance to stay current with emerging technologies, tools, and teaching methodologies. Consequently, instructors of Civil Technology can embrace more efficient and captivating methods to impart practical skills to their pupils. Furthermore, every individual who took part in the program disclosed that teachers of Civil Technology can enhance their comprehension of the practical skills they instruct by attending workshops and training programs. Hence, their proficiency can result in more precise and enlightening instruction, making it easier for learners to understand difficult ideas. Strong opinions also existed that claimed that although some teachers gained confidence in their ability to teach, they lacked the necessary tools to use creative teaching methods in their real-world classes. Unfortunately, this study also showed that some teachers still struggle with finding instructional resources that are appropriate for teaching and learning Civil Technology practical skills in the classroom. This deprives both teachers and students of the chance to demonstrate their knowledge and skills, which may be harmful to their motivation and career prospects. However, according to Stronge's (2018) conceptualization, this study's findings may prevent teachers from adopting the characteristics of effective teaching. Teaching quality may therefore decline if instructors fail to adopt the attributes of successful teachers as defined by Stronge (2018). The reason for this is that the efficacy of instruction can be adversely affected by the absence of these crucial attributes, which include reflective practice, pedagogical skills, and content knowledge. Consequently, learners may not receive the same adequate hands-on skills for Civil Technology and support necessary for academic and industrial needs. This study concluded that more work remains to be done to address challenges and devise strategies to ensure that teacher skill development and educational resource provision are integrated to ensure a correlation that will benefit Civil Technology students.

According to the present findings, the following recommendations are aimed at ensuring that Civil Technology teachers are well equipped with both hands-on skills and educational resources for effective teaching of practical lessons. Thus, this study recommends that the Gauteng Department of Education (GDE) should establish a curriculum and Annual Teaching Plan (ATP) with enough time allocations for Civil Technology teachers to practice skills acquired during training workshops while teaching. Furthermore, frequent training sessions must be organized for adaptable Civil Technology hands-on skills instead of educating teachers with abilities for that year's specific Practical Assessment Task (PAT). Also, reflecting from the findings, this study also advice the GDE to not only focus on hands-on skills development but also develop teachers innovative and creative skills. This will also allow the Civil Technology

teacher to be able to design and evaluate their own practical activities for learners training and assessment purposes. The GDE must ensure that the supply and maintenance of all tools and equipment is delivered fairly and on schedule to ensure that simulations are conducted on time and effectively for the benefit of both Civil Technology teachers and learners' development of hands-on skills. Lastly, this study recommend that the department focus on instructional methods, new teaching methodologies for skills-based activities, and the supply of educational resources to teachers to encapsulate the attributes of effective instructors espoused by Stronge (2018).

Limitations

This study was limited to Civil Technology teachers from the Ekurhuleni, Gauteng East schools in Gauteng Province. With this limitation, the was a restriction in the generalizability of the findings to a larger population. Future studies should include a larger and more diverse participant pool to enhance the representativeness of the results. Additionally, the study only enquired about equipment of Civil Technology teachers with hands-on skills and educational resources for effective teaching of practical lessons. Future research should include participants from various districts in the province and solicit input from teachers of various technical subjects to gain comprehensive information about the relationship between the development of Civil Technology teachers' skills and the use of educational resources. The study used a limited sample size of nine Civil Technology teachers. Including more individuals may have resulted in different outcomes. It is suggested that future study include teachers and department leaders for more information. Finally, while this study used a mixed method research design, future studies could benefit from combining qualitative and quantitative methodologies.

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