The Teaching of Design and Technology Subjects During Free Education Period in Selected Secondary Schools in Kitwe, Zambia

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ABSTRACT

The purpose of the study was to investigate the teaching of Design and Technology subjects during free education period in Zambia. This was a descriptive study that used a sample size of 60 pupils and teachers from secondary schools in Kitwe District. The sample for the study was selected using cluster sampling. The data was collected using a self-administered questionnaire. The questionnaire was self-administered to the teachers and the learners. The collected data were analyzed using descriptive statistics with the aid the Statistical Package for Social Sciences software. The findings are presented in the form of frequencies to answer the research questions. The results revealed that that the quality of teaching of Design and Technology as a practical subject was compromised due to the increased enrollment levels and limited or lack of equipment and infrastructure to teach the subject effectively. As a result, teachers resorted to teaching the subject theoretically; thereby, compromising the prescribed methods of teaching Design and Technology. The study recommends that classes should be decongested by constructing more classrooms, more schools, and providing more equipment and teaching and learning materials for practical lessons.

Keywords: Design and Technology, free education

INTRODUCTION

Owing to the rapid technological changes and the emerging issues related to learners' poor performance in practical subjects such as Design and Technology, education systems are currently undergoing transformation throughout the globe (Dagher & BouJaoude, 2011). They are shifting from a philosophy that focuses on the theoretical transmission of information to a more constructivist paradigm of teaching and learning which believes in learning by doing. As a result, there have been a number of education reform projects throughout the world, which aim at preparing learners to meet the current needs of technological advances and new labor market needs (Dagher & BouJaoude, 2011). Therefore, to promote a deep conceptual understanding and development of positive attitudes in practical subjects, there have been great emphases on design and technology education methodologies that promote hands-on learning and teaching.

In the past, Design and Technology (DT) as a subject, was often considered in Zambian schools to be woodwork, metalwork, and textiles, which is a fundamentally outdated and incorrect view of the subject. However, the 2012-revised curriculum recognized DT to be a valuable practical subject in schools. Through Zambia Education Curriculum Framework, the government endeavored to integrate Technical Drawing (TD), Geometrical and Mechanical Drawing (GMD), Metal and Woodwork in DT subject (Mobela,

2016). Therefore, Design and Technology (DT) is a new course in place of Industrial Arts which was a composition of Technical Drawing (TD), Geometrical and Mechanical Drawing (GMD), Metalwork and Woodwork, Industrial Arts, Home Economics, Art and Design. They have the educational objectives of developing certain qualities in learners and the content of the syllabus relate to domestic life, commercial activities, and self-employment attitude.

The skills developed through Design and Technology subjects can help with overall learning across the rest of the curriculum. Design and technology education provides students with a range of skills that will be essential in the workplace. These skills include design making, and engineering. Students develop their creative and practical skills, as well as a greater understanding of the principles of design, such as problem-solving, creativity, and the environment. Pupils also develop better communication and teamwork skills, which are important for working in industry and commerce (Sibanda, 2013). Students studying Design and Technology will also learn how to be more creative and entrepreneurial, which will benefit the economy and society at large. The practical nature of the subject also enables students to take risks and be more resourceful and enterprising. In addition, students will have opportunities to apply value judgments and evaluate their own work (Kapambwe, 2022).

In addition to enhancing learning, design and technology education also helps to develop critical thinking skills, problem-solving skills, knowledge of materials, mechanisms, and electrical control (Kapambwe, 2022). It also helps students develop creativity and innovation and prepares them for the world of work they will find in the designed world (Mobela, 2016). Overall, Design and Technology prepares its students to participate in tomorrow's rapidly changing world. Students learn to think creatively and solve problems as individuals and as part of a team.

The Design and Technology syllabus encourages the learner-centered approach as prescribed in the Zambia Education Curriculum Framework. The emphasis should be on skills, problem-solving, and hands-on activities which will increase learner participation as individuals or in groups (Dagher & BouJaoude, 2011). This can best be achieved when learners are actively involved in the learning process through hands-on activities. Therefore, teaching methods should include among others working in pairs, group work, individual work, field trips, projects, discussions, contact with resource persons, demonstrations, and team teaching (Mobela, 2016). However, the implementation of these methods is likely to be affected due to the challenges related to the increased enrolment owing to free education provision.

The introduction of free education, which was implemented in January 2022 was designed to increase access to quality education among school children and youths of school-going age. Since the free education policy was introduced, schools have been overwhelmed by the positive response of communities that have seen the need to send children to school. Because of the free education policy, various regions of the country have been reporting the enrolment of thousands of school children and youths. For example, in North Western Province, at least 4,700 pupils have gone back to school after the government introduced free education. Northern Province reported that 45,000 pupils had been re-admitted. Copperbelt, the study site, is another region that had seen a surge in school enrolment. The introduction of free education had created an increase in the number of learners from 756,299 recorded in January 2021 to 800,288 in January 2022. This represents an upsurge of 40,000 learners (Odesomi, 2023).

Although the Free Education Policy received a lot of praise and had positively affected enrollments, it generated commonly observed phenomenon across the world in education systems, which include, the inadequacy of physical facilities, school furniture, equipment, and teachers, among others. Therefore, Free Education Policy had led to large class sizes and overburdening of teachers, hence, negatively affecting the quality of education because class size is one of the primary aspects that measure educational quality (Mobela, 2014). In addition, insufficient teaching and learning materials, and lack of learning spaces and equipment all compromise the quality of education. In addition, teachers find it easier to teach practical subjects such as design and technology teach using theory. To this effect, this study investigated the teaching of Design and Technology as a hands-on subject in the context of free education in Kitwe District of Zambia.

There has been extensive research done on the teaching of practical subjects. According to various studies (Newcombe and Stumpers, 2013; Sigurdsson, 2016), schools have a responsibility to build practical skills in students in their formative years to help them become skilled entrepreneurs with useful ideas that will advance society. The purpose of practical subjects is to provide students with the abilities and attitudes they will need to adapt to the constantly shifting circumstances of today's world (McGee, 2013). As a result, instructors play a key role in ensuring that practical courses were taught in schools.

Practical subject instruction is crucial because it helps students become independent and resilient in the face of constantly shifting economic situations. Schools that emphasize practical learning develop people who can work for themselves (McGee, 2013). Students who study practical subjects develop the skills necessary to launch their own firms in the future and, as a result, participate in societal change as entrepreneurs. The major goal of practical subjects is to equip students with the knowledge and abilities needed to work in a particular occupation. Dillon (2008) found that engaging in practical work could boost learners' enthusiasm and sense of ownership over their education. In a similar vein, Sigurdsson (2016) finds that practical subjects boost students' feelings of personal fulfillment. In most instances in practical subjects, learners produce items as individuals, hence, learners get personal satisfaction when they look at their products.

Teaching practical subjects also helps students get ready for a variety of careers. Top graduate and professional colleges are also accessible through practical disciplines. The majority of technical, vocational, or professional studies at the university are built on the foundation of practical topics. Dillon (2008) has outlined the competencies, propensities, talents, and characteristics typically related to instructing and studying practical subjects. These include knowledge building and ability to analyze, as well as evaluative and critical thinking, creative thinking, effective oral and written communication, critical and reflective reading, pattern intelligence, numerical skills, and synthesis abilities.

Practical subjects help to develop skills that are needed in other subjects. According to Mcgee (2013), it is equally important to engage students in practical topics where they will engage in hands-on activities that will help them develop skills that they may utilize in other subjects, such as improving their English language abilities, among others. Thus, practical subjects are crucial because they help students develop abilities that they can apply to other subjects. Despite the advantages, some challenges hinder the teaching of practical subjects. Research (e.g. McGee, 2013; Sigurdsson, 2016, etc.) shows that practical work such as design and technology has a number of challenges that hinder effective learning and teaching.

One of the main obstacles to organizing high-quality education is the lack of textbooks and study materials. Without textbooks, the skills, concepts, and content required in the curriculum cannot be taught (Ghana Education Sector Report, 2004). UNESCO states that improving the quality of education depends largely on providing appropriate and high-quality books and other learning materials to teachers and students (Oakes and Saunders, 2002). According to Fuller (1985), studies conducted in California found that teaching materials, especially textbooks and libraries, are consistently related to learning quality because they are a source of meaningful information and a basis for inquiry and evaluation. Lockheed et al. (1986) reported their analysis of longitudinal data from the IEA's Second International Mathematics Study, which included pre-test and post-tests to study textbook use in Thailand, and found that students used textbooks frequently and scored significantly better on achievement tests.

Furthermore, Gamawa (2015) showed that inadequate equipment for practical lessons also revealed a major challenge faced in the teaching and learning of practical work. The lack of well-equipped laboratories and the inability of teachers to improvise instructional materials hindered the teaching and learning of the subject. Newcombe and Stumpers (2013) in their study found that inadequate instructional materials, lack of improvisation on the side of teachers and lack of utilization of teaching aids as well as inadequate laboratory facilities constituted problems in the teaching and learning in Clothing and Textile subject. Gamawa (2015) further revealed that learners who chose practical subjects such as Home Economics were expected to provide necessary equipment on their own with limited support from the government. This gave rise to a lack of interest

in the subject and many parents were discouraging their children from doing the subject because it is capital intensive.

Another challenge that affects the teaching of practical subjects is funding. Mobela's (2015) study showed that public funding of schools to support free primary education was insufficient. The study also revealed that the funds allocated to the schools were irregular and had not arrived on time to help the school meet its operational costs. According to MOE (2003), Mobela (2015), the budget allocated to education in Zambia is the smallest in the sub-region compared to the overwhelming need for those schools. This shows the difficulties in the operation and management of primary schools.

According to Orlosky (1984) cited by MOE (2011), the adequacy of funding and its effective management determines the management of the school and whether the school achieves its goals. If government funding is not sufficient, schools will not be able to obtain all the goods and services necessary to achieve their goals. Therefore, the government is expected to transfer funds to schools on time (MoE, 2011). A study by MoE is consistent with the AMAP study, which found that the level of funding in Zambia's education sector significantly explains the poor performance of the sector in terms of access and quality of services. The study revealed that after the abolition of user fees, the government tried to finance free education, although at a very low level, for example in 2001, about 20 percent of the total budget was allocated to education (MOE, 2011). As a result, as revealed by Chakamba, Jumo, Edziwa, and Misozi (2013) in a study conducted on vocational subjects, most of the equipment outlined in the syllabus were not available. Some broken, damaged or dilapidated equipment had not been replaced or maintained and this led to the reduced number of functional equipment. This was defeating the aspect of vocationalisation, as the subject matter could not be taught using abstractions.

Class size is also a challenge related to the teaching of practical subjects. Huebler (2008), in his presentation at the International Education Statistics on pupil-teacher ratio, argued that in large classes, the quality of education suffers since individual attention is not possible. Similarly, Agrist and Lavy (1999) analyzed data from Israeli public schools and used class size predicted by an Israeli class size rule on the recommendation made by Moses Maimonides (12th century Talmudic scholar) that forbids a class size of more than 40 in the reading and Mathematics scores of fifth grades. They found that reducing the class size by 6 pupils increased reading scores from 0.2 to 0.5 standard deviation and Math scores from 0.1 to 0.3 9 (Hyukuk, Paul and Melissa, 2012). In the 1980's the Student-Teacher Achievement Ratio (STAR) project in Tennessee (United States) which covered almost 12,000 students from kindergarten to grade 3, over a four-year period, to study the impact of class size on pupil achievement, showed that reducing class size had a positive impact on pupils' academic achievement, especially for children from disadvantaged social backgrounds (GMR, 2005).

Related to class size is the classroom environment. Taylor and Vlastos (2009) developed a theory regarding the relationship between environment and design within the classroom. They referred to the physical environment of the classroom as the "silent curriculum" and hold strongly to the belief that classroom environment contributes to quality education (Brittany and Katie, 2011). The classroom is the immediate management environment for formal knowledge acquisition (Sunday, 2012). It plays an important role in students' cognitive and affective development (Baek and Choi, 2002). For the Classroom organization to support the type of schedule and activities a teacher has planned, it must be well-structured. This will not support it and it can impede the functioning of the day as well as limit what and how students should learn. Indeed, a well-arranged classroom environment is one way to manage effectively instruction because it triggers fewer behavior problems and establishes a climate conducive to learning (Caroline and Elizabeth, 2010). A study by the Ministry of Education, in New Zealand in 2004, in an attempt to understand the influence of classroom environment on learners' outcomes, found that a well-spaced classroom supported teaching and learning hence greater student achievement.

The preceding literature has demonstrated that the teaching of practical subjects is critical for learners to acquire employable skills. Despite the positives related to the teaching of practical subjects, the class size, lack of materials and equipment, and the availability of teachers normally affect the implementation of the

curriculum. Apparently, these challenges increase with the introduction of free education, which specifically affects class size. Therefore, this study sought to investigate the teaching of Design and Technology with the increased enrollment and class size in Kitwe District, Zambia.

The introduction of the free education policy in Zambia has significantly increased student enrollment across the country, leading to overcrowded classrooms in many secondary schools, particularly in Kitwe District. Although the policy aims to improve access to education, it has inadvertently led to severe challenges in maintaining educational quality, especially for practical-oriented subjects like *Design and Technology (D&T)*. This subject traditionally relies on hands-on activities and a learner-centered approach, which require small class sizes, sufficient resources, and close teacher-student interaction. However, due to the current classroom congestion, teachers are now compelled to rely more heavily on theoretical approaches, compromising the core practical elements of D&T.

Prior to the introduction of free education, Zambia's secondary school pupil-teacher ratio was already high at 36.9, and in primary schools, it was 61.9. Since the policy change, these numbers have risen dramatically, with some classrooms accommodating over 100 students (MoE, 2022). Such class sizes make it nearly impossible to provide each student with adequate time, attention, and resources for meaningful hands-on learning. According to Sibanda (2013), class size is a critical determinant of educational quality, especially for subjects that depend on experiential learning. In the current situation, the large student numbers have made it increasingly difficult for teachers to implement practical learning, forcing them to resort to lecture-based, theoretical instruction, which limits students' ability to fully engage with D&T.

Teachers in Kitwe have adapted by using more theory-focused teaching methods, as the logistics of managing practical exercises for large groups are impractical. This shift from practical activities to theory-heavy instruction is concerning because it detracts from the intended experiential learning outcomes of D&T. Practical subjects like D&T are meant to equip students with hands-on skills essential for technical fields; however, theory-focused teaching fails to provide the tactile and applied learning experiences students need (Doud et al., 2013). As a result, students are less prepared to demonstrate or apply technical skills, raising fears about the effectiveness of D&T education under the free education system.

The shift toward theory-centered approaches is evident in the teaching methods that have become prevalent in Kitwe's overcrowded classrooms. Faced with large class sizes and limited resources, teachers have had to adjust their instructional strategies to manage student behavior and cover the curriculum, even if it means sacrificing practical learning. One of the methods used is group based. Group-based learning is commonly used, as it enables teachers to manage large numbers of students by dividing them into smaller groups for assignments or projects. While this method allows for some level of collaboration, the practical engagement of each student is limited. In large classes, teachers cannot oversee each group's work closely, which often results in more capable students taking the lead while others remain passive.

Group-based learning in such settings can dilute the practical learning experience, as students do not receive adequate individual guidance or hands-on practice. Further, due to the high number of students, teachers frequently rely on demonstration-based teaching, where they perform a task or process in front of the class while students watch. This approach allows teachers to cover material quickly, but it limits students' opportunities to practice and refine their skills (Preece et al., 2004). Theoretical understanding may improve slightly, but without hands-on practice, students struggle to internalize and apply what they observe. This method is particularly limiting for D&T, where hands-on activities are crucial for skill acquisition. This constraint results in a superficial understanding of D&T rather than the in-depth practical knowledge that the subject aims to foster.

Some schools have implemented a rotation system for practical activities, where small groups take turns using the limited materials and equipment. This method attempts to ensure that each student has some hands-on experience, but the limited time and resources mean that practice opportunities are brief and infrequent. Consequently, many students do not receive the practice needed to master technical skills. This rotation

system, while a practical solution, is an inadequate substitute for consistent, individualized hands-on learning in D&T.

To investigate the teaching of D&T in secondary schools of Kitwe District, the study used Kolb's Experiential Learning Theory (1984). This theory suggests that learning occurs through a cycle where knowledge is created by transforming experiences. This cycle comprises four stages: Concrete Experience, where learners engage in a hands-on experience; Reflective Observation, where they reflect on and observe the outcomes; Abstract Conceptualization, where they form theories based on their reflections; and Active Experimentation, where they apply new knowledge or test ideas in practice. In Design and Technology, a subject reliant on practical skills, this learning cycle ensures that students not only acquire theoretical knowledge but also learn through action, experimentation, and reflection. This approach is especially crucial for students to build and internalize practical skills effectively (Doud et al., 2013).

If Kolb's Experiential Learning Theory has already been applied in similar studies, its use would highlight how practical, hands-on learning impacts skill acquisition and student engagement, especially in settings where Design and Technology (D&T) or similar subjects are taught. By looking at how Kolb's theory has been previously employed, this can gain insights into its effectiveness in assessing and enhancing practical education, especially in resource-constrained environment (Illeris, 2018). Using this theory, the study focused on examining the teaching of design and technology in secondary schools of Kitwe District to analyze whether students undergo Kolb's four learning stages—Concrete Experience, Reflective Observation, Abstract Conceptualization, and Active Experimentation—to acquire practical competencies (McGrath,2010). The theory has been particularly useful for assessing if students receive sufficient opportunities for hands-on engagement, whether reflection is part of the process, and if students can apply learned concepts to real-world scenarios.

METHODOLOGY

The study adopted a descriptive research design which aimed at describing the characteristics of the teaching of Design and Technology subjects during the free education period in secondary schools of Kitwe District, Zambia. The study site was among the secondary schools of Kitwe District on the Copperbelt of Zambia.

The target population of the study was 345 teachers and pupils of secondary schools where Design and Technology subjects were being offered in Kitwe District.

Simple cluster sampling technique was used to select the sample size of the respondents for the study. These were considered the custodians of the teaching and learning of Design and Technology subjects during the free education policy.

The selection of the sample was conducted using a multistage sampling technique. The first stage involved purposively selecting Copperbelt Province. The second stage involved randomly selecting Kitwe District from the nine (9) districts of the province. The third stage was done by purposively selecting three secondary schools offering Design and Technology. The fourth and last stage involved randomly selecting 19 pupils and a teacher from each school (20x3=60). Thus, a sample size of 60 respondents who were selected to participate in the study represented 17% of the target population (345).

Data for this study were collected using a self-administered questionnaire. The questionnaire contained questions on the availability of teaching materials, frequency of practical lessons, venue for practical lessons and challenges encountered in the teaching of Design and Technology subjects.

The analysis of data was conducted using descriptive statistics with the aid of the Statistical Package for Social Sciences (SPSS 16) software.

RESULTS

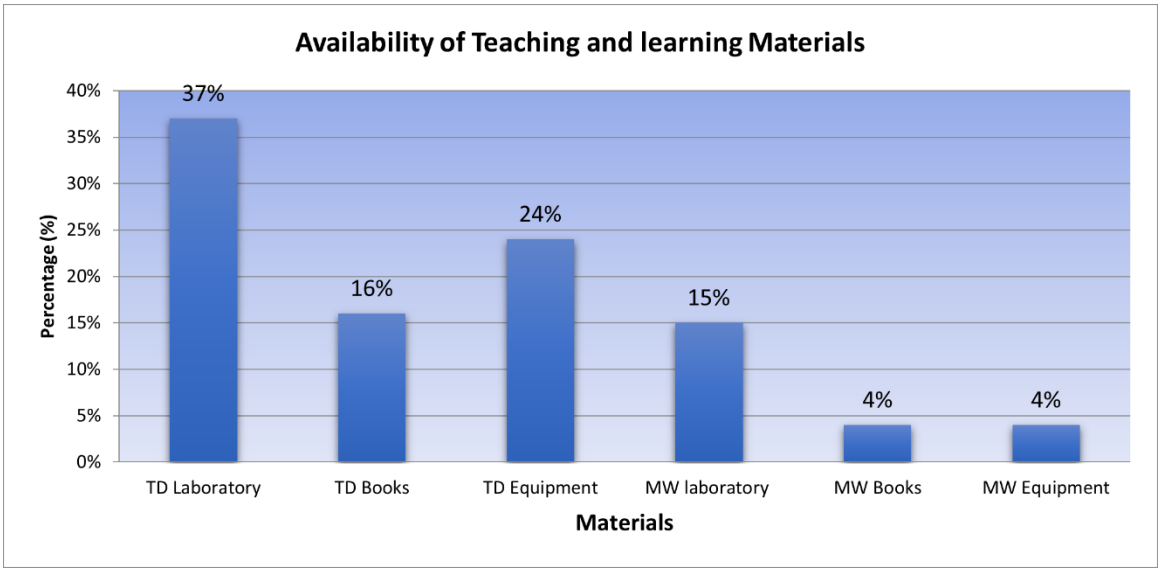

Figure 1: Availability of teaching and learning Materials

Figure 1 presents data on the available teaching and learning materials for Design and Technology subjects. The results showed the available TD laboratories (37%), TD books (16%), TD equipment (24%), MM laboratories (15%), MW books (4%), and MW equipment (4%). The results indicated that TD laboratories were available in several schools but lacked books and equipment. Similar findings were recorded in the interviews, for instance, some educators complained that, '*We do not have enough teaching materials; most of the materials we use we just improvise*'

The study also sought to establish the frequency of D&T practical lessons in schools, and the details of the results are in Figure 2.

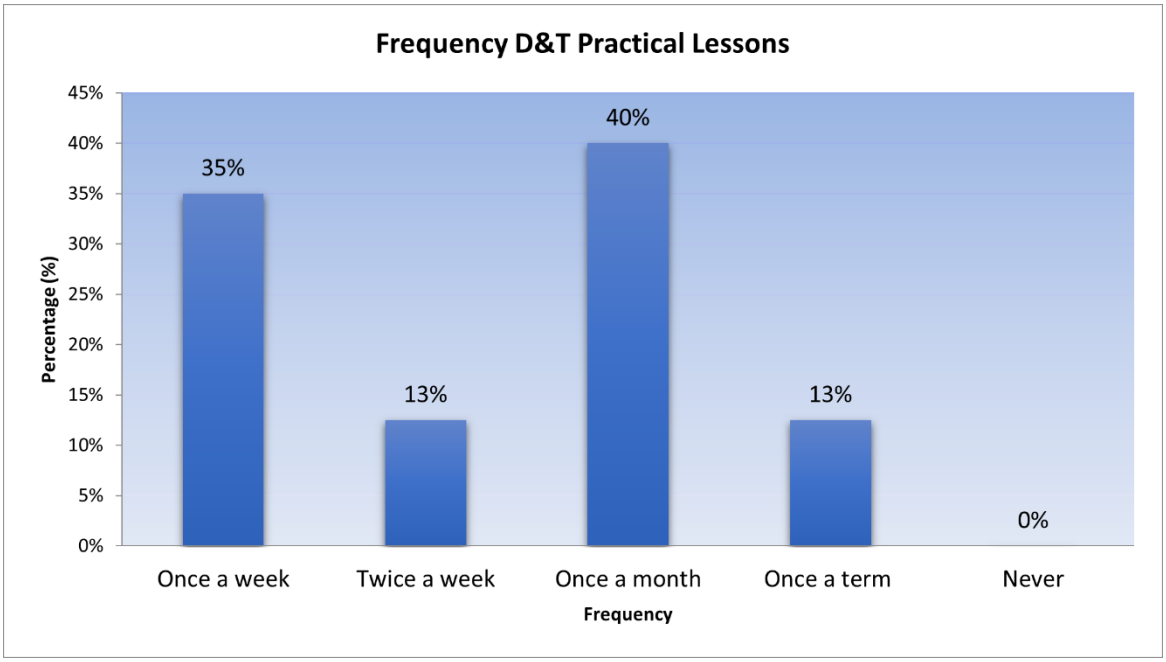

Figure 2: Frequency of Design and Technology practical lessons.

Figure 2 shows the frequency of Design and Technology practical lessons among secondary school pupils. The results revealed that the subjects had practical once a week were at 35 percent (35%), twice a week (13%), once a month (40%), and once a term (13%). The forgoing results were also experience in the qualitative data

from the interviews. Participant indicated that, "*It is difficult to have practicals as per the syllabus because of the lack of space*"

Further, the study explored the possible venues used for practical lessons for Design and Technology in secondary schools. The results are presented in Figure 3.

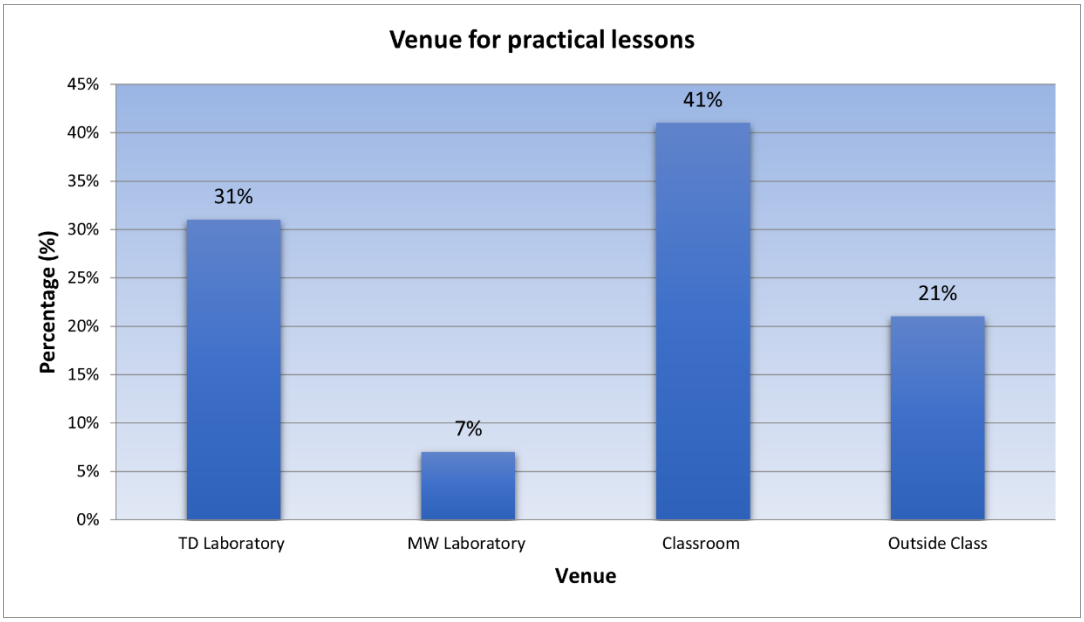

Figure 3: Venues for Design and Technology Practical Lessons

Figure 3 shows places where practical lessons for Design and Technology subjects were held in schools. The results showed that 31% of the practical lessons were conducted in Technical Drawing Laboratory, Metal Work Laboratory (7%), classrooms (41%), and outside classrooms (21%). This revealed that 62% of the practical lessons were held either in the classroom or outside the classroom implying that schools did not have specified rooms where the practical lessons would be conducted.

The study also sought to establish the challenges affecting teachers in the teaching of DT in secondary schools. The results are presented in Figure 4.

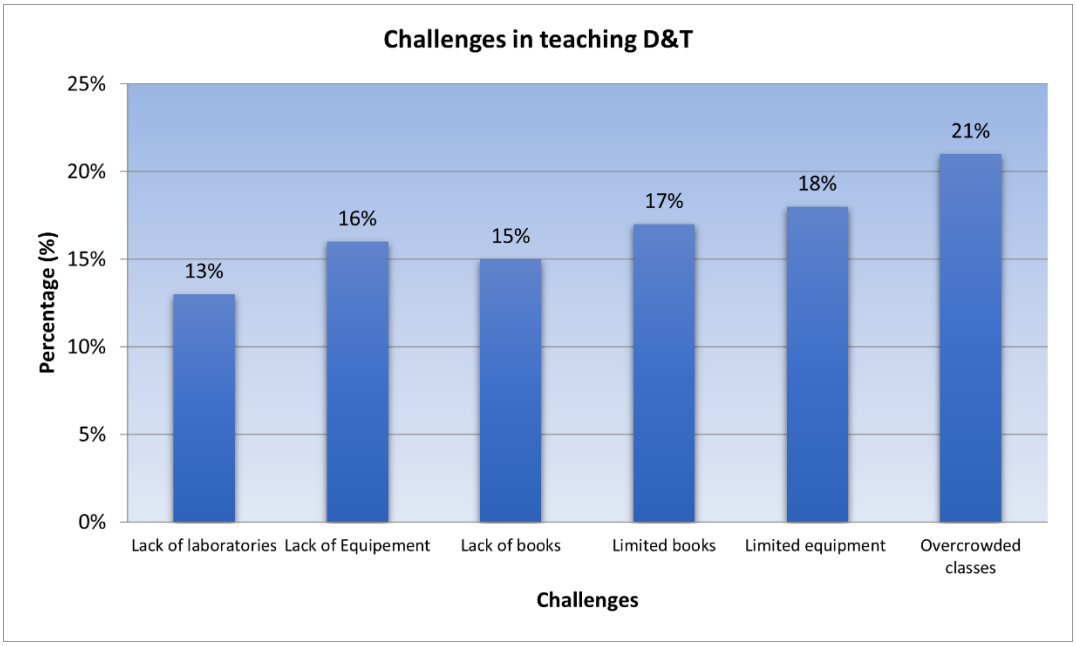

Figure 4: Challenges in teaching Design and Technology

Figure 4 shows the challenges experienced in the teaching of Design and Technology in schools. The data showed that 13% lacked laboratories, 16% lacked equipment and 15% lacked books, 17% had limited books, 18% had limited equipment and 21% had overcrowded classes. Most schools experienced more than one of these challenges, which indeed made it difficult for the teachers to effectively teach the DT subjects.

DISCUSSION

The first objective of the study was to establish the availability of teaching and learning materials for design and technology subjects amidst free education. The study findings revealed that the laboratories were available in most of the schools but equipment were either limited or lacking. The results are consistent with Gamawa (2015) who found that a shortage of acceptable equipment for practical lessons was a significant challenge facing the teaching and learning of practical work in schools. The results were not surprising as several schools especially the ones built after independence had laboratories but had equipment which should be replaced since some of them were dilapidated. Therefore, the government should supply new equipment to the schools offering Design and Technology subjects in the country.

The study's second objective was to establish the frequency of practical lessons in Design and Technology. The study showed that several schools had practical lessons once a week (35%) and once a month (40%). The results indicated that, while some schools managed to have one practical lesson per week as prescribed in the syllabus, most of the learners had practical lessons once a month contrary to the prescribed frequency of once a week. The results are consistent with Taylor and Vlastos (2009) who noted that, because of class size, teachers avoided conducting practical lessons. The results were expected as there were insufficient equipment and materials to be used in the laboratories. Thus, it was difficult to have practical lessons in the schools on a weekly basis. The limited number of practical lessons could also be attributed to budget constraints. Possibly, the funding was not enough for schools to be able to buy enough materials and equipment to carter for every practical lesson, hence, the need to ration what they received from the government. Therefore, there was a need to increase funding in this regard.

The third objective was to determine the challenges encountered in the teaching of Design and Technology in schools during the free education period. The results showed that the challenges encountered included lack of laboratories, lack of equipment, and lack of books, limited number of books (17%), inadequate equipment (18%), and overcrowded classes (21%). This indicates that the major challenge in the teaching of Design and Technology subjects is overcrowded classes. The results suggest that overcrowding because of increased enrollment had affected teaching and frequency of practical lessons in Design and Technology subjects. The results correspond with those in a study by Sunday (2012) who indicated that class size affected the quality of education. Similarly, because of class size, teachers were likely to avoid giving practical lessons to the learners if there was not enough space and equipment. They would rather present a practical lesson theoretically, thereby, compromising the teaching of practical subjects. Thus, there was a need to reduce class size to the manageable levels.

The Ministry of Education (1996) justifies the inclusion of practical and technical education in the school curriculum among other claims by saying that "they possess a potential relationship to the world of work, hence, may help to prepare pupils for post-school employment or vocational training".

CONCLUSION

The purpose of the study was to investigate the teaching of Design and Technology during free education period in Zambia. These subjects were meant to give learners skills that could help to improve their focus, cognitive ability, creativity and hands-on skills. The study established that the quality of teaching of Design and Technology as a practical subject had been compromised due to the increased enrollment, limited or lack of equipment and insufficient infrastructure. As a result, teachers resorted to teaching the subject theoretically, thereby, compromising the prescribed methods of teaching of Design and Technology subjects.

Based on the study findings and conclusion, the study recommends, firstly, that there was a need to decongest classes by building more classes or schools with modern equipment and materials for teaching and learning Design and Technology subjects. Secondly, the government should increase funding for practical subjects in schools. Thirdly, there was a need to increase monitoring to ensure that teachers followed the prescribed methods of teaching Design and Technology. Fourthly, schools should consider building rooms or workshops for Design and Technology subjects. Lastly, school should provide and secure the required equipment for all the Design and Technology subjects.

REFERENCES

1. Bulfin, M. (2012). *Zambia's education system in historical context: Spark ventures and a qualitative analysis of hope ministries' operational environment.* Chicago: A Spark Ventures publication.
2. Crouch, L., & Winkler, D.(2008). "“Paper commissioned for the EFA Global Monitoring Report 2009, Overcoming inequality: why governance matters”.
3. Dagher, Z. R., & BouJaoude, S. (2011). *Science education in Arab states: Bright future or status quo? Studies in Science Education, 47(1), 73-101.* 47(1), 73-101.
4. Dillon, J. (2008). "A review of the research on practical work in school science. London: King‟s University." London
5. Gale, L. (2002). "Teacher education: Evaluating practical teaching in secondary schools." *Paedagogica Europaea* (1973): 132-137.
6. Hampwaye, G., & Mweemba, L. E. (2012). " A profile of higher education in Southern Africa ." *Zambia country profile* 2 (2012): 105-113.
7. Jones, A. Z. (2011). *Nations convention on the rights of the Child: social inclusion and participation.* Washington, D.C: World Bank.
8. Kapambwe, S.(2022). *Free education in Zambia. https://www.times.co.zm/?p=119043*. Lusaka, 18 August 2022. Free Education in Zambia.
9. Kaulule, R. S. (2006). *The effects of free education policy in basic schools in Zambia.* Lusaka:: The University of Zambia., Lusaka.
10. Lauglo, J., Akyeampong, A.K., Mwiria, K., & Weeks, S.G.(2012) . *Vocationalized secondary education revisited.* Washington DC: World Bank.
11. Masumba, C. K., & Mulenga, I. M. (2019). "Teachers' pedagogical content knowledge for teaching computer studies in rural Zambian secondary schools of North-western Province." *Zambia Journal of Library & Information Science (ZAJLIS)*: 3 (1 & 2). 90-106.
12. Ministry of Education. (2011). Policy statement by the minister of education. Lusaka. GRZ.
13. Ministry of General Education. (2013). The Zambia education curriculum framework. Lusaka: MoE.
14. MoE. *Educating our future: A national policy on education.* Lusaka: MoE., 1996.
15. MoGE., (2016),. *Educational statistical bulletin.* Lusaka:MoGE.,
16. Moobola, L., & Mulenga, I. M. (2020). "Social studies curriculum at The crossroads: Implementation of the secondary school Social Studies curriculum in Chingola district of Zambia.*European Journal of Education Studies. 7(3), 13-34." http://dx.doi.org/10.5281/zenodo.3750518.*
17. Mukudi, E. (2004). "Education for all: A framework for addressing the persisting Illusion for the Kenyan context. *International Journal of Education Development.* 24(3), 231-240. http://doi:10.1016/j.ijedu.dev.2003.(10.009)."
18. Mwiria, K. (2002). *Vocationalization of secondary education: Kenya case study.* Nairobi: Regional Vocational Skills Development Review.
19. Oakes, J., & Saunders, M. (2002). "Access to text books, instructional material equipment & technology inadequacy & inequality in California's public schools. UCLA'S Institute for Democracy, Education and Access, Los Angeles."
20. Odesomi, O. (2023). "Understanding Zambia's free education programme and the way forward. https://www.africanleadershipmagazine.co.uk/understanding-zambias-free-education-programme-and-the-way-forward/."

21. Wallenborn, M. (2010)."Vocational education and training and human capital development: current practice and future options." *European Journal of Education* 2010: Vol. 45, No. 2, pp.181–198.