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Occupational-Related Constraints Hindering the Pedagogical Practice of Technical Drawing in Secondary Schools in Benin City.

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Abstract

The fundamental role of technical drawing in providing the language of technology upon which technical competencies are anchored in emerging nations such as Nigeria cannot be underestimated. Consequently, the objective of this study was to investigate the occupational-related constraints hindering the pedagogical practice of technical drawing in secondary schools in Benin City. A survey research design was employed, and the population consists of all technical drawing teachers in both publicly and privately owned secondary schools. The sample includes one hundred (100) technical personnel selected through a purposive sampling procedure. A questionnaire developed into five-point modified Likert formats comprising 17 items was used. The instrument was validated by three academics. The internal consistency of the instrument was established utilising Cronbach's Alpha (ά), which yields a reliability coefficient of 0.800, and the data was analysed using means and standard deviations. The findings revealed that the most frequent occupational-related constraints hindering the pedagogical practice of technical drawing in secondary schools include the cost of buying modern textbooks in the subject, lack of modern teaching aids/tools, and insufficient specialised technical teachers, among others. However, the least constraint was the stress of teaching technical drawing. Additionally, no significant difference in the occupational-related constraints hindering the pedagogical practice of technical drawing based on school ownership and teachers' gender. Therefore, it was recommended among others that

government and private school operators should provide a decent, well-equipped, and motivating work environment that empowers technical drawing teachers.

Keywords: occupational-related, constraints, hindering, pedagogical practice, technical drawing, secondary schools, Benin City

Introduction

Science and technology education serves as a vital platform for developing the skilled workforce necessary to drive a nation's economy. It produces technologists, technicians, craftsmen, and other artisans essential for national development (Elom, 2014). Within this framework, technical drawing functions as a universal language used by engineers and technical professionals to communicate complex information visually, rather than through words (Olaoye & Adameji, 2023). It is essential for translating designs into physical objects and plays a vital role in understanding and communicating technical concepts.

In Nigeria, technical drawing is one of the core components of technical education curricula across secondary schools, technical colleges, and tertiary institutions (Ekwu, 2003; Chedi, 2015). At the secondary school level, it is offered as an elective subject, while in technical colleges, it is a required trade-related course for students pursuing engineering and construction disciplines (Sulaiman & Akeem, 2014). The subject is foundational, as it helps students visualise and conceptualise engineering ideas before actual implementation (Ekwu, 2003).

However, the teaching and learning of technical drawing have long been constrained by systemic and structural challenges. According to Olabiyi and Abayomi (2020), many public secondary schools lack essential physical infrastructure, such as studios or workshops, and face shortages of instructional materials like drawing boards, set squares, T-squares, and French curves. Efforts to modernise the curriculum with computer-aided design (CAD) tools are often thwarted by inadequate power supply and a lack of functional computer laboratories (Olawale, 2019). Elom (2014) averred that these issues are compounded by outdated pedagogical approaches that rely heavily on theory rather than practical, hands-on instruction, a retrogressive approach that limits students' technical proficiency.

These problems extend beyond secondary education. As Olaoye and Adameji (2023) observed that tertiary institutions also struggle with implementing virtual instruction in technical drawing, citing barriers such as high internet costs, lack of equipment, and erratic electricity supply.

Moreover, a significant concern is the scarcity of qualified technical drawing teachers. Hence, many schools are forced to assign general science or technical education teachers who lack specialised training in graphical communication (Nwachukwu & Okeke, 2017; Osagie, 2015). Sadly, many of these teachers are not conversant with modern drafting technologies such as AutoCAD and SolidWorks. Okoye and Arimonu (2016) highlighted challenges in manpower development in technical education, including underfunding, outdated curricula, inadequate facilities, and an inability to keep pace with technological advancements.

Additional barriers include the general neglect of technical and vocational education and training, poor societal attitudes, and brain drain. Agbonghale and Iserameiya (2018) also reported a lack of trained instructors, limited access to practical experiences, absence of seminars, insufficient studio equipment, and a scarcity of up-to-date textbooks.

Besides, gender-related challenges have also been stressed in technical education. For instance, Agbara et al. (2016) establish that female students in technical education face issues such as financial constraints, sexual harassment, childbirth during study, and limited learning resources. Meanwhile, Javier (2022) posited that private school teachers often face more acute challenges than their counterparts in public schools.

Although previous research has examined the general difficulties surrounding technical education, little attention has been given to the specific occupational-related challenges faced by technical drawing teachers. These challenges directly affect instructional quality and student outcomes, often resulting in poor academic performance and the graduation of underprepared students (Chedi, 2015). Therefore, this study aims to investigate the occupational-related constraints hindering the pedagogical practice of technical drawing in secondary schools in City, Nigeria.

Statement of the Problem

The pedagogical practice of technical drawing in secondary schools is fraught with occupational-related challenges that hinder instructional effectiveness, diminish teacher morale, and compromise overall educational quality. Despite its central role in engineering, architecture, and vocational education, technical drawing remains under-supported in many Nigerian secondary schools. Teachers often grapple with outdated instructional materials, a lack of access to modern tools such as computer-aided design (CAD) software, and limited opportunities for professional development. These deficiencies are compounded by overcrowded classrooms and insufficient institutional support for continuous skills enhancement. Furthermore, the rapid evolution of technology underscores the need for educators to frequently update their competencies; a need that many schools fail to adequately

address. More worrisome is that teachers are also burdened with the task of motivating students who may view technical drawing as abstract, obsolete, or excessively difficult, particularly in Nigeria's learning environment that prioritises theoretical instruction over hands-on, practical engagement. It is regrettable that these challenges do not merely affect instructional delivery but have far-reaching consequences on students' achievement and interest in technical careers. This anomaly of occupational-related constraints, if not unravelled and addressed, may lead to diminishing academic performance, reduced student enrolment in technical subjects, and a weakened pipeline for skilled technical manpower in the country. Considering these pressing concerns, this study seeks to examine and analyse the occupational-related constraints hindering the pedagogical practice of technical drawing in secondary schools in Benin City.

Research Questions

The following research questions were generated to provide focus and direction for the study.

1. What occupational-related constraints hinder the pedagogical practice of technical drawing in secondary schools in Benin City?
2. Are there significant differences in the occupational-related constraints hindering the pedagogical practice of technical drawing school ownership?
3. Are there differences in the perceived occupational-related constraints hindering the pedagogical practice of technical drawing-based teachers' gender?

Hypotheses

1. There is no significant difference in the occupational-related constraints hindering the pedagogical practice of technical drawing based on school ownership.
2. There is no significant difference in the perceived occupational-related constraints hindering the pedagogical practice of technical drawing-based teachers' gender.

Objective of the Study

The study aims to investigate the occupational-related constraints hindering the pedagogical practice of technical drawing in secondary schools in Benin City. Specifically to:

1. Find out the occupational-related constraints hindering the pedagogical practice of technical drawing in secondary schools in Benin City.
2. Determine if there is a significant difference in the occupational-related constraints hindering the pedagogical practice of technical drawing based on school ownership.
3. There is no significant difference in the perceived occupational-related constraints hindering the pedagogical practice of technical drawing-based teachers' gender.

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Methodology

The study utilised a survey research design. The population consists of all technical drawing teachers in both public and private secondary schools in Benin City. The sample for the study was one hundred (100) technical students selected through purposive sampling from both private and public schools offering technical drawing in the city. This sampling technique was adopted due to the limited number of schools and teaching technical drawing teachers in the City. The instrument was a structured questionnaire developed into five-point modified formats comprising 17 items developed by the researchers based on the literature reviewed. The instrument underwent content and face validity through the judgment of three lecturers. They were required to ascertain the appropriateness of the instrument, irrelevant statement(s) or wordings. The Cronbach Alpha (ά) test of reliability was employed in establishing the internal consistency of the instrument, which yields a reliability coefficient of 0.800. Data obtained from the respondents was analysed with means and standard deviations. The decision was based on a criterion mean of 3.00. The hypotheses were tested with an independent samples t-test.

Results

Research Question 1:

What occupational-related constraints hinder the pedagogical practice of technical drawing in secondary schools in Benin City?

Table 1: Descriptive statistics of occupational-related constraints hindering the pedagogical practice of technical drawing in secondary schools in Benin City

Remarks		Mean	Std. Deviation
Student fear of technical drawing	3.87	1.27	Agree
Student attitudes towards the subject	3.86	1.14	Agree
Loss of interest in the subject	3.81	1.19	Agree
Lack of modern teaching aids/tools	4.02	1.08	Agree
Lack of support from parents	3.70	1.35	Agree
Non-availability of a well-equipped drawing studio	3.82	1.23	Agree
Stress of teaching technical drawing	3.44	1.35	Agree
Cost of buying a modern textbook in the subject	4.11	1.23	Agree
Cost of buying drawing materials	3.88	1.24	Agree
Switching from the traditional mode of teaching technical drawing to the modern method	3.64	1.25	Agree
Insufficient specialised technical teachers	4.00	1.25	Agree
Insufficient classrooms	3.74	1.33	Agree
Poor cooperation from management	3.71	1.34	

Table 1 shows the mean scores for occupational-related constraints hindering the pedagogical practice of technical drawing in secondary schools in Benin City, ranging from 3.44 to 4.11, which were above a criterion mean of 3.00. The respondents agreed that the cost of buying modern textbook in the subject (Mean=4.11; SD=1.23), lack of modern teaching aids/tools (Mean=4.02; SD=1.08), insufficient specialised technical teachers (Mean=4.00; SD=1.25), cost of buying drawing material (Mean=3.88; SD=1.24), student fear of technical drawing (Mean=3.87; SD=1.27), student attitudes towards the subject (Mean=3.86; SD=1.14), non-availability of well-equipped drawing studio (Mean=3.82; SD=1.23). In addition, the results from the table indicate that the respondents were also in agreement that loss of interest in the subject (Mean=3.81; SD=1.19), insufficient classrooms (Mean=3.74; SD=1.33), poor cooperation from management (Mean=3.71; SD=1.34), switching from traditional mode of teaching (Mean=3.64; SD=1.25) and the stress of teaching technical drawing (Mean=3.44; SD=1.35). However, the least challenge was the stress of teaching technical drawing.

Ho_1

There is no significant difference in the constraints hindering the pedagogical practice of technical drawing based on school ownership.

Table 2: Independent sample t-test of the difference in the constraints hindering the pedagogical practice of technical drawing based on school ownership

		Mean	**Std. deviation**	**t**	**p**	**Remark**
School Ownership	Public	51.13	7.51	229	.820	Not Significant
	Private	50.71	6.97			

Table 2 shows an independent sample t-test comparing the mean score for occupational-related constraints hindering the pedagogical practice of technical drawing based on school ownership. The table further indicates the mean scores for public school (*M*=51.13; *SD*= 7.51) and private school (*M*=50.71, *SD*= 6.97*)*; *t* = .229, *p*=.820 (two-tailed). Since the p-value of .820 is higher than the (ά) value of 0.05, the null hypothesis, which states "there is no significant difference in the occupational-related constraints hindering the pedagogical practice of technical drawing based on school ownership secondary schools in Benin City", is retained.

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H_{O2}

There is no significant difference in perceived occupational-related constraints hindering the pedagogical practice of technical drawing based on the teacher's gender.

Table 3: Independent sample t-test of the difference perceived occupational-related constraints hindering the pedagogical practice of technical drawing based on teachers' gender

		Mean	Std. deviation	t	p	Remark
Gender	Male	51.18	7.17	.425	.67	Not Significant
	Female	50.50	7.71			

Table 3 shows an independent sample t-test comparing the mean score for the differences perceived occupational-related constraints hindering the pedagogical practice of technical drawing based on the teachers' gender

The results further indicate the mean scores for male (M=51.18; SD= 7.17) and female (M=50.50, SD= 7.71); t = .425, p= .67 (two-tailed). Since the p-value of .67 is higher than the (ά) value of 0.05, the null hypothesis that states "there is no significant difference in perceived occupational-related constraints hindering the pedagogical practice of technical drawing based on teachers' gender" is retained.

Discussion of Findings

The findings revealed that the most occupational-related constraints hindering the pedagogical practice of technical drawing in secondary schools in Benin City were the cost of buying modern textbook in the subject, lack of modern teaching aids/tools, insufficient specialised technical teachers, cost of buying drawing materials, student fear of technical drawing, student attitudes towards the subject, non-availability of well-equipped drawing studio among others. However, the least challenge was the stress of teaching technical drawing. These findings corroborate Agbonghale and Iserameiya (2018), who averred that the challenges of teaching and learning technical education in universities include insufficiently trained technical drawing teachers, non-exposure of students to practical technical drawing, non-procurement of facilities, insufficient studio instruments, and unavailability of good technical drawing textbooks in the libraries, among others. Further, it agrees with Elom (2014), whose study suggested that one of the major challenges of technical drawing is technical teachers' reliance on traditional methods rather than emphasising a practical approach to teaching. Therefore, the interest of the students could only be positive

when the right tools and equipment are on the ground, coupled with a decent learning environment.

Additionally, the study found no significant difference in the occupational-related constraints hindering the pedagogical practice of technical drawing based on school ownership in Benin City. This finding is at variance with earlier findings, which reported a significant difference in the mean score for the extent of challenges by public and private school teachers (Javier, 2022). The divergent results may be ascribed to differences in the location of the studies. Moreover, the current study exclusively focused on technical drawing.

Lastly, the study revealed no significant difference in perceived occupational-related constraints hindering the pedagogical practice of technical drawing based on teachers' gender. This finding is at variance with Agbara et al. (2016), who found that the challenges experienced by female students in technical education is associated with finance, sexual harassment, and insufficient learning resources.

Conclusion

In conclusion, teaching technical drawing in secondary schools in Nigeria faces numerous constraints such as student fear of technical drawing and attitudes towards the subject, loss of interest in the subject, lack of modern teaching aids/tools, lack of support from parents, on availability of well-equipped drawing studio, stress of teaching technical drawing, cost of buying modern textbook in the subject, cost of buying drawing materials, switching from traditional mode of teaching technical drawing to modern method, insufficient specialized technical teachers which put pressure on the available teachers, insufficient classrooms and poor cooperation from management. More apparent is that these constraints encountered by these teachers are the same for both public and private secondary schools and do not differ based on the gender of the teachers.

Recommendations

Consequent upon the challenges identified in this study, the following recommendations are suggested to support technical drawing teachers in Nigerian secondary schools and enhance the overall quality of instruction:

1. Government and private school operators should provide a decent, well-equipped, and motivating work environment that enables technical drawing teachers to perform effectively.
2. Addressing the identified constraints requires urgent and strategic investment in both human and material resources to strengthen technical education.
3. Adequate investments should be made in the provision of essential drawing equipment, functional studios, and modern teaching aids, including digital tools and software.

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4. There is a pressing need to recruit professionally trained technical drawing teachers and to retrain existing ones, especially in emerging technologies such as computer-aided design (CAD) and modern pedagogical methods and industry-relevant skills.

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