ATTARBAWIY: Malaysian Online Journal of Education
(e-ISSN: 2600-7622)

PERCEIVED DIFFICULT TOPICS IN TECHNICAL DRAWING CURRICULUM AMONG SCHOOL OF SCIENCE STUDENTS IN IBADAN METROPOLIS

Topik yang Dianggap Sukar dalam Kurikulum Lukisan Teknikal dalam Kalangan Pelajar Sekolah Sains di Metropolis Ibadan

***Abd-El-Latif Adekunle ABD-EL-AZIZ[1], Farouk Abiodun RAJI[1], Rafiu ABDULWAHAB[2]**

[1]Department of Educational Technology,
Faculty of Education, University of Ilorin,
P.M.B. 1515, Ilorin Nigeria.

[2]Department of Adult and Primary Education Studies,
Faculty of Education, University of Ilorin,
P.M.B. 1515, Ilorin Nigeria.

*Corresponding author's email: abdelaziz.aa@unilorin.edu.ng

Submited:	**Accepted**:	**Revised**:	**Published**:
03-Mar-2025	13-Mar-2025	27-Jun-2025	29-Jun-2025

Abstract

Kajian itu mengenal pasti topik yang dianggap sukar dalam lukisan teknikal di kalangan Pelajar Sekolah Sains Negeri Oyo di metropolis Ibadan. Satu soalan kajian dan satu hipotesis membimbing kajian. Kajian ini menggunakan reka bentuk tinjauan deskriptif dalam rangka kerja penyelidikan korelasi, menggunakan teknik persampelan pelbagai peringkat. Soal selidik mengenai Perceived Difficult Topik dalam Kurikulum Lukisan Teknikal di kalangan Pelajar Sekolah Sains di Ibadan Metropolis (QPDT-TDC-SSS) adalah instrumen yang digunakan untuk pengumpulan data. Kesahan muka dan kandungan QPDT-TDC-SSS telah ditubuhkan oleh tiga pakar pendidikan teknologi. Pekali kebolehpercayaan QPDT-TDC-SSS menghasilkan 0.85 menggunakan teknik kebolehpercayaan Cronbach Alpha. Kiraan kekerapan, peratusan, min, dan sisihan piawai digunakan untuk menjawab persoalan kajian, manakala ujian-t digunakan untuk menguji hipotesis pada aras keertian 0.05. Keputusan yang diperoleh menunjukkan bahawa dua puluh lima topik dianggap mudah dan tujuh belas topik dianggap sukar. Selain itu, tidak terdapat perbezaan yang signifikan dalam topik yang dianggap sukar dalam kurikulum lukisan teknikal antara pelajar lelaki dan perempuan. Berdasarkan dapatan kajian, adalah disyorkan antara lain supaya kerajaan, melalui Kementerian Pendidikan, menganjurkan dan menggalakkan guru lukisan teknikal menyertai kursus ulang kaji, bengkel dan persidangan secara berkala dalam usaha untuk mengemas kini dan meningkatkan pengetahuan dan kemahiran pedagogi guru.

Kata kunci: Topik Sukar, Persepsi Pelajar, Lukisan Teknikal, Kurikulum Lukisan Teknikal dan Jantina

Abstrak

The study identified perceived difficult topics in technical drawing among Oyo State School of Science Students in the Ibadan metropolis. A research question and one hypothesis guided the study. The study employed a descriptive survey design within a correlational research framework, utilizing a multi-stage sampling technique. The questionnaire on Perceived Difficult Topics in Technical Drawing Curriculum among School of Science Students in Ibadan Metropolis (QPDT-TDC-SSS) was the instrument used for data collection. Face and content validity of QPDT-TDC-SSS was established by three technology education experts. The reliability coefficient of QPDT-TDC-SSS yielded 0.85 using the Cronbach Alpha reliability technique. Frequency count, percentages, mean, and standard

deviation were used to answer the research question, while a t-test was used to test the hypothesis at a 0.05 level of significance. Results obtained indicated that twenty-five topics were perceived as easy and seventeen topics were perceived as difficult. In addition, there is no significant difference in the perceived difficult topics in the technical drawing curriculum between male and female students. Based on the findings of the study, it was recommended among others that the government, through the Ministry of Education, organize and encourage technical drawing teachers to participate in refresher courses, workshops, and conferences regularly in a bid to update and enhance teachers' pedagogical knowledge and skills.
***Keywords**: Difficult Topics, Students' Perception, Technical Drawing, Technical Drawing Curriculum and Gender*

1.0 INTRODUCTION

1.1 Concept of Perceived Difficult Topic and Technical Drawing in the Engineering and Related Occupations

Increased interest in the trends of challenging concepts or topics in a school subject is becoming sensitive issue such that urgent attention is required. This is so because when difficulties are experienced in learning, achievement may be frustrated. Udousoro (2011) had earlier expressed that the difficulty level of the contents of most school subjects remains an educational critical issue yearning for attention. Aniaku and Nwankwo (2024) therefore explain that when a topic is different to understand by the learners to understand, it is considered a difficult topic. Edeh (2015) further put it that those topics that are difficult to teach by the teachers and learn by the students respectively, are perceived as difficult topics.

In this case, the way students perceive learning is important and has a crucial implication on the overall quality of learning by the influence exerted on the quality of the learning process and the outcome of any educational endeavour. For this study, perceived difficulty would be seen as the concept of easiness or difficulty as perceived by individual students. Meanwhile, technical drawing is seen as the basis of imagination in all trades, occupations, and professions relating to engineering and technology, and still seems to be a difficult skill to learn among secondary school students in the school of science.

Olaoye and Adameji (2023) describe technical drawing as a common language of engineering and technology that describes the process of creating drawings for any engineering or architectural application. For this reason, technical drawing (TD) in the engineering world is seen as a critical and relevant subject for technological development and as such, should be handled seriously as a secondary school subject, especially in a country yearning for solid technological advancement like Nigeria.

Marwa et al (2020) explained that when technical drawings are produced according to accepted standards and formats, they provide an effective and efficient way to communicate specific information about design intent. Nurdin et al (2023) therefore put it that this might have prompted most technical trades, occupations, companies, and industries to resort to the use of technical drawing for sharing, documenting design intent, and parts to be manufactured. Marwa et al (2020) further identified other terms used to describe technical drawing as drafting, engineering drawing, engineering drafting, mechanical drawing, mechanical drafting, and technical drafting. The term technical drawing is used for this study.

Makgato and Khoza (2016) explain that in most cases, it becomes difficult to describe or explain the parts to be manufactured without a technical drawing. This is

so because technical drawing communicates a variety of concepts, such as engineering requirements, instructions, and proposals (Nurdin et al, 2023), to a variety of people, most especially, different individuals often involved with a project. The implication, according to Marwa et al (2020), is that technical drawing or a complete set of engineering drawings provides all the data required to manufacture or construct an item or product, such as a machine part, consumer product, or structure. By so doing, technical details and specific dimensions, materials, and procedures are included, and these are essential for communicating ideas in industries and engineering companies.

1.2 Secondary School Career Prospects and Technical Drawing

Secondary school students are the future engineers, technologists, and technicians who will later work in the industry. Based on this premise, some states in Nigeria created a school of science, which is the equivalent of a secondary school. It is believed that those students who attended the school would later enter into science and technology-related trades, occupations, or disciplines, and may eventually lead them to set up their own workshop or become an industrialist. This might have prompted the reason why the Oyo State Ministry of Education has made it mandatory for all students in their schools of science to acquire technical drawing knowledge and skills at entry level in preparation for tertiary institutions and the dynamic world of work by making TD compulsory during their SSI class.

In a bid to ensure that technical drawing is unambiguous and relatively easy to learn by the students, Alada and Bekdaú (2018) explain that a better arrangement is for students to learn how to use a visual language such as symbols, perspectives, units of measurement, notation systems, visual styles, and page layout. By so doing, the study of technical drawing by students across all levels of the Nigerian education system, who are the potential future employees of these companies and industries, would provide effective learning.

1.3 Difficult Topics and Students' Learning in Nigerian Secondary Schools

Taking into consideration the importance, the aforementioned relevance and roles of technical drawing in the field of science, engineering, and technology, students are expected to be encouraged and develop interest owing to the benefits, relevance, and roles of technical drawing in their various prospective science, engineering, and technological future careers. More so, given the practical nature of technical drawing combined with the efforts by teachers to improve the students' learning using a variety of strategies, it is expected that every student should find the subject to be very interesting.

On the contrary, it could be observed that the interest of most students in the Oyo state school of science in TD is getting poorer as they progress up the ladder in their academic pursuit. The students are unable to understand the rudiments and have poor visualization of the technical drawing problems or questions. Then, it becomes worrisome that less than 15% of those students who started TD at SSI sat for technical drawing WAEC exams in their final year of study. Observations further revealed that most students often believe and complain that technical drawing is a difficult subject to learn. The impression, according to Wordu (2019), is brought on by some of the difficult topics that are inherent in the subject.

Learning technical drawing requires much intellectual thought because it is a hands-on-experience subject replete with abstract visualizations in a bid to establish meaningful links, and bring lines, curves, and other components into a coherent whole figure (Alada & Bekdaú, 2018). It would be easier for students who have better

understanding of the rudiments required in approaching the drawing problem to arrive at befitting solutions to the tasks given on their own. The case may be contrary when students have little or no understanding of a drawing visualization or perception then they are likely to resort to rote learning. The consequence of which, some topics may be frightening to the students and thus prompt them to perceive the topics as difficult. This suggestion might have prompted many topics in technical drawing that appear to be abstract and are difficult to comprehend by the students. These abstract notions are crucial and worrisome, as learning the rudiments of technical drawing may be difficult for students to grasp.

Premised on the above, Oladejo et al (2023) define difficult topics as the extent to which the topic can be comprehended by a learner, or which simply implies ease or difficulty in attaining a concept. Oladejo et al (2023) further explain that the spectrum stretches from "least difficult," where the learner very readily progresses the learning from rote to meaningful learning, to the polar end of "most difficult," where the learner encounters challenges in meaningfully learning the concept. Consequently, weak attainment is associated with the difficulty of the concept.

Meanwhile, Ogunkola and Samuel (2011) pinpoint that understanding of students' views on what makes their learning effective is crucial, and must be carefully considered by researchers, teacher educators, teachers, and schools in a bid to improve the quality of students' learning. Students' opinions and views on technical drawing in the school of science indicated that some topics are difficult to learn. This might lead some students to become passive, less responsive in learning, and prevent them from listening well, and in turn prevent the information conveyed by the teacher from being received by students optimally.

In fact, it has become the common phenomenon that once the topics are perceived as difficult by the students, it becomes frightening and promotes students' lack of interest in such subjects. This is so because, lack of students' interest in a school subject had earlier been attributed to factors such as strategies used to teach, teachers' experience, qualifications and attitude towards teaching; students' study habits; and difficulty of topics in the curriculum as perceived by students among others (Ogunkola & Samuel, 2011). Difficulty of topics would no doubt create a serious threat to the students' learning and make it impossible.

2.0 LITERATURE REVIEW ON PRACTICAL AND PEDAGOGICAL APPROACHES FOR ADDRESSING DIFFICULT TOPICS AT SECONDARY SCHOOL LEVEL

Meanwhile, with this noticeable unsatisfactory situation among technical drawing students, a search for related and relevant literature indicated a significant gap in the area of study, that is, investigation of difficult topics in the technical drawing curriculum. Wordu (2019), however, conducted a study to identify topics perceived as difficult by Electrical and Electronics Trades Students in the study of Technical Drawing Curriculum in the four Government Technical Colleges in Rivers State. The findings of the study revealed that out of the 19 items provided in the Technical Drawing Curriculum, three items, that is, Drawing Definitions, Identification and Use of Material Tools, Angles, and Triangles only were perceived as less difficult.

Meanwhile, nine items that includes Board Practice; Safe Working Habits; Lines and Line Work; Circles and Triangles; Quadrilateral; Scales; Enlargement and Reduction of plain figure; Dimensioning Techniques; and Introduction to Computer Graphics were perceived as moderately difficult. More so, seven items which are Polygons; Equal areas of Similar Figures; Tangents and Tangency; Special Curves; True Lengths and Surface Development; Isometric Drawing; and Oblique Drawing were

perceived as very difficult. The findings of the study according to Wordu indicated that the levels of difficulty is higher with the latter items in the order of arrangement in the curriculum as Indicated In the findings of the study.

The indication is that the aim of teaching technical drawing among others as a technology subject in school of science in a bid to have the national goals for education fulfilled may be defeated. Such outcomes will encompass knowledge, skill, and attitudes that guarantee maximum positive participation of students in the society after graduation, especially in Nigeria, which is working towards being technologically and economically self-reliant and efficient. More importantly, teaching and learning of technical drawing, among other technology education subjects, are impeded by multiple issues.

Researchers have earlier identified problems of visualization (Da Silva & Agostinho, 2018; Jamilu, 2015) as one of the major challenges encountered by both teachers and students while teaching and learning technical drawing is in progress. More so, lack of technical drawing teachers, lack of equipment, instruments and materials to teach Technical drawing (Onoselease & Ejodamen, 2018), non-availability of drawing studio workshops and facilities, perceived difficulty being experienced by the teachers and students and their impact on students' learning (Hassan and Maizam (2017).

Visualization, according to Da Silva and Agostinho (2018) is the ability to generate a mental image, perform various transformations on the image, and retain the settings in the representation of objects by the viewers. Spatial visualization guides the transition between two-dimensional depictions and three-dimensional objects and vice versa with the help of the brain through vision and as such, remains fundamental to understanding technical drawing (Da Silva and Agostinho, 2018). It is the mental visualization of an object in a spatial form and is very important for the engineer when drawing and interpreting technical drawings. This fact translates thinking and modeling into product development.

Meanwhile, Da Silva and Agostinho (2018) recommended a strategy for the enhancement of students' skills in spatial perception during the teaching and learning process. A framework for application development and organized in three phases and seven steps, was proposed. Phase 1, which is Planning, consists of Activities that identify the activities for the study; Subject that considers the participants and the environment that are perceived in two stages, that is, manual and computer application; and Pedagogical, which is mainly Problem-Solving-based Learning strategy.

Phase 2 consists of Manual technical drawing. The steps include Adaptation, Spatial perception, and origami system; and Technical drawing I: sequential instruction in manual technical drawing adopting PBL application. Phase 3 consists mainly of strategies on CAD, that is, Computer-aided drawing. Da Silva and Agostinho reported that the experiences using the proposed framework application are interesting, as expressed by both teachers and students who participated in the study. It also added to teachers' knowledge and skills on how to equip students to learn, to see, think, and create, thus facilitating perceiving objects without seeing them.

Jamilu (2015) further recommends the use of didactic interventions that incorporate visualization tools in the form of CAD software and multimedia with a number of media attributes, such as pictures and animations, among others, for overcoming the situation. Meanwhile, the literature review and documents analysis according to Jamilu (2015) indicated that the use of visualization tools in the form of CAD software, and multimedia approaches to teaching technical drawing with a number of media attributes, such as pictures and animations, among others, to overcome the situation. Hence, Jamilu (2015) is optimistic that innovative teaching

methods using ICT, such as Computer Animated Module for Engineering Drawing (CAMED), will make tremendous progress in understanding visualization problems.

Hadebe and Lincolyn (2022) further identified Practical pedagogy as an important approach that can be used to resolve any issues across all disciplines and as such, could also be employed to resolve issues of difficult concepts for students in technical drawing. More importantly, technical drawing is equally a practical-oriented school subject. They expressed that it applies to all careers in all fields that are based on the skills developed from practical pedagogy and knowledge. The goal of providing learners with useful life skills can be successfully achieved if the conceptual knowledge of schooling is supported by the inclusion of practical pedagogy.

Hadebe and Lincolyn therefore put it that all deeper and multi-dimensional understanding and appreciation of nature and life processes can be effectively understood and achieved through experimentation and hands-on-practical pedagogical orientation. Practical pedagogy according to Hadebe and Lincolyn is inquiry oriented, whereby learners become actively involved in knowledge creation, acquisition of several intellectual benefits such as observing, classifying, interpreting, designing, organizing, reporting, presenting and accurately generalizing. In this case, the teacher's role or responsibility is to make the process of learning both meaningful and ultimately more life-oriented and applicable to daily living. Meanwhile, the focus of this is on the identification of difficult topics in technical drawing in the Oyo State School of Science in Ibadan Metropolis.

Empirical evidence, both at home and abroad, from other science related subjects in secondary schools such as Basic Science (Babayemi et al, 2018), Basic Technology (Abd-El-Aziz et al, 2020), Mathematics (Olawumi & Oyebola, 2020; and Olubukola, 2015), Physics (Taangahar & Okwori 2022; and Adebisi et al, 2020), Chemistry (Oladejo et al, 2023; Nartey & Hanson, 2022; and Moyo, 2018), Biology (Chukwuemeka & Dorgu, 2019; and Etobro & Fabinu, 2017) and Economics (Mohammed & Jimoh, 2022) among others indicated the availabilities of difficult topics in their respective curriculum.

Possible solutions were recommended by the scholars and researchers in their respective fields. There is also strong indications that insufficient knowledge of perceived difficulties by students in technical drawing may be one of the contributing factor to students' complains and decline interest in technical drawing. This is an area therefore, that requires in-depth investigation among school of science students in Ibadan Metropolis.

The need to address the under-representation of female students and their learning in a number of school subjects seems to have captured the attention of researchers in the world and other stakeholders in education. Many scholars feel bothered on the possible influence gender may contribute to the understanding of various concepts of school subjects. These have prompted various researchers' inclusion of gender to verify the possibility of its influence.

Many researchers have established significant gender difference in their studies in favour of male. On the other hand, Nurdin et al, (2023) and Taangahar and Okwori (2022) in their respective report indicated that male and female students and teachers had similar perception on difficulty levels of Biology topics and students' perception of difficult concepts in physics does not significantly differ based on gender. On this note, the study intends to further make a case to unravel the contribution of gender on the students' perception of technical drawing topics difficulty level.

3.0 RESEARCH OBJECTIVES

The main objective of this study was to investigate perceived difficult topics in technical drawing curriculum among school of science students in Ibadan metropolis. Specifically, the study sought to:

a) entify the perceived difficult topics in technical drawing curriculum among school of science students in Ibadan metropolis; and
b) examine the influence of gender on the perceived difficult topics in technical drawing curriculum among school of science students in Ibadan metropolis

4.0 RESEARCH QUESTION

What are the perceived difficult topics in technical drawing curriculum among school of science students in Ibadan metropolis?

Hypothesis
HO1: There is no significant difference in the perceived difficult topics in technical drawing curriculum by male and female school of science students in Ibadan metropolis

5.0 RESEARCH METHODOLOGY

Descriptive survey design was adopted for the study. Frankel and Wallen (2014) explain that descriptive survey permits description of the state of the events as they exist and provides opportunity for quantitative and qualitative research approaches and hence, considered suitable for the study. The study was conducted in Oyo State Schools of science in Ibadan Metropolis.

The population for the study consisted of all students in Oyo State Schools of science offering technical drawing in Ibadan Metropolis. The senior secondary school students, that is, SS3 students offering technical drawing and preparing for their final year WAEC examination constitutes the target population. There are three schools of science in Ibadan metropolis, two in the city of Ibadan and one in the less-city. There are 56 students (39 males and 17 females) In the two school of science In the city of Ibadan. A multi-stage sampling technique was used for the study. Purposive sampling technique was first used to select the two school of science in the city of Ibadan because they have functional drawing studio equipped with computer facilities while Convenience sampling technique was used to select Fifty three (consisting of thirty eight males and fifteen females) participants for the study.

The Instrument for data collection for study consisted of 43-items technical drawing checklist that contained all the 43 concepts in technical drawing curriculum and tagged "Questionnaire on Perceived Difficult Topics in Technical Drawing Curriculum among School of Science Students in Ibadan Metropolis" (QPDT-TDC-SSS). QPDT-TDC-SSS consists of two sections. Section A is used for obtaining demographic data which is mainly the gender of respondent. Section B consists of a checklist with the list of all topics in Technical Drawing curriculum for Senior Secondary School in Nigeria. A 5-point Likert scale using the following mode of response: Very Easy = 1 (topic understood first time with little effort), Easy = 2 (topic understood after a little work), Moderate = 3 (topic understood after a moderate amount of work), Difficult = 4 (topic only understood after hard work and efforts), and Very Difficult = 5 (topic never understood and will need to be re-taught) was used. The mean decision rule

for cut-off point is 3.00. This implies that any item with mean of 3.00 and above is difficult while the items with mean below 3.00 are easy.

Face and content validity were conducted on QPDT-TDC-SSS by three technology education experts from the Departments of Science and Technology Education, University of Lagos, Akoka. The comments and suggestions of the experts on the clarity and scope of the contents were incorporated in building the final draft of the instrument. QPDT-TDC-SSS was trial tested on seventeen students in another school of science in Oyo central senatorial district. The internal consistency of QPDT-TDC-SSS using Cronbach alpha reliability technique was 0.85.

The consent of the school principals and technical drawing teachers were sought and secured. The principals and technical drawing teachers assisted the researcher in controlling and soliciting for the cooperation of students in their respective schools. Copies of QPDT-TDC-SSS were administered and collected through direct approach by the researcher and two trained research assistants. Fifty three copies of questionnaires were distributed and retrieved. Frequency count, percentages, mean and standard deviation were used for the research question while t-test was used to test the hypothesis at 0.05 level of significance.

6.0 DATA ANALYSIS AND FINDINGS

Results

Research Question 1: What are the perceived difficult topics in technical drawing curriculum among school of science students in Ibadan metropolis?

Table 1: Frequency Count, Percentages, Mean Ratings and Standard Deviation of Students on Perceived Difficult Topics of Technical Drawing Curriculum

S/N	Curriculum Topics	VD	D	M	E	VE	Mean	SD
		Freq. (%)	Freq. (%)	Freq. (%)	Freq. (%)	Freq. (%)		
Drawing Studio Practice								
1.	Drawing Materials and Equipment	-	-	-	17 (32.08)	36(67.92)	1.32	0.211
2.	Board Practice	5(9.4)	2(3.8)	2(3.8)	24(45.28)	20(37.74)	2.02	0.275
3.	Safe Working Habits	3(5.66)	5(9.4)	5(9.4)	22(41.51)	18(33.96)	2.11	0.287
Geometrical Construction								
4.	Lines and Line Work.	4(7.55)	2(3.8)	7(13.21)	15(28.30)	25(47.17)	2.36	0.293
5.	Angles and Triangles	-	2(3.8)	2(3.8)	27(50.94)	22(41.51)	1.70	0.127
6.	Circles and Triangles	-	3(5.66)	7(13.21)	20(37.74)	23(43.4)	1.81	0.311
7.	Quadrilaterals	11(20.75)	6(11.32)	3(5.66)	18(33.96)	15(28.3)	2.62	0.327
8.	Polygons	3(5.66)	2(3.8)	6(11.32)	19(35.84)	23(43.4)	1.81	0.151
9.	Scales	2(3.8)	6(11.32)	1(1.89)	19(35.84)	25(27.17)	1.87	0.217
10.	Enlargement and Reduction of Plane Figures	1(1.89)	2(3.8)	2(3.8)	22(41.51)	26(29.06)	1.68	0.213
11.	Equal Areas of Similar Figures	11(20.75)	20(37.74)	3(5.66)	18(33.96)	2(3.8)	3.43	0.323
12.	Tangents and Tangency	5(9.4)	14(26.42)	4(7.55)	13(24.53)	17(32.08)	2.57	0.325
13.	Special curves	3(5.66)	13(24.53)	6(11.32)	12(22.64)	19(35.84)	2.42	0.295
Development of Geometrical Solids								

14.	The Lengths and Surface Development	2(3.8)	12(22.64)	2(3.8)	15(28.3)	22(41.51)	2.09	0.255
	Pictorial Drawing							
15.	Dimensioning Techniques	3(5.66)	3(5.66)	1(1.89)	19(35.84)	27(50.94)	1.72	0.253
16.	Isometric Drawing	-	1(1.89)	3(5.66)	30(56.6)	19(35.84)	1.74	0.257
17.	Oblique Drawing	1(1.89)	2(3.8)	2(3.8)	22(41.51)	26(29.06)	1.68	0.213
18.	Introduction to Computer Graphics	9(16.98)	20(37.74)	2(3.8)	18(33.96)	4(7.55)	3.23	0.307
	Geometrical Construction							
19.	Special Curves	3(5.66)	12(22.64)	6(11.32)	13(24.53)	19(35.84)	2.38	0.273
20.	Link Mechanism	5(9.4)	16(30.2)	3(5.66)	12(22.64)	17(32.08)	2.19	0.257
	Development of Geometrical Solids							
21.	True Shapes	26(49.1)	17(32.08)	2(3.8)	5(9.4)	3(5.66)	4.09	0.473
22.	Intersection of Solids	15(28.3)	31(58.49)	3(5.66)	4(7.55)	-	4.08	0.471
	Pictorial Drawing							
23.	Perspective Drawing	21(39.62)	18(33.96)	3(5.66)	5(9.4)	4(7.55)	3.77	0.357
24.	Auxiliary Views of Geometrical Solids	22(41.51)	19(35.84)	5(9.4)	4(7.55)	3(5.66)	4.00	0.375
25.	Computer Aided Drawing (Pictorial and Auxiliary View)	16()	7(13.2)	5(9.4)	10(18.87)	15(28.3)	2.29	0.263
	Points and Lines in Space							
26.	Traces of a Point and Line in Space	8(15.1)	19(35.84)	4(7.55)	19(35.84)	3(5.66)	3.19	0.303
27.	True Lengths and Angles of a Line in Space	29(54.7)	14(26.4)	3(5.66)	5(9.4)	2(3.8)	4.19	0.431
28.	Planes and Views in Space	21(39.6)	15(28.3)	9(16.98)	3(5.66)	5(9.4)	3.83	0.407
	Building and Engineering Design and Drawing							
29.	Orthographic Projection	2(3.8)	5(9.4)	4(7.55)	15(28.3)	27(50.94)	1.87	0.217
30.	Building Design and Working Drawing	4(7.55)	17(32.1)	4(7.55)	19(35.84)	9(16.98)	2.77	0.333
31.	Details of parts of Building,	5(9.4)	18(33.96)	5(9.4)	18(33.96)	8(15.1)	3.09	0.297
	Building and Engineering Drawing							
32.	Freehand Drawing and Sketching	3(5.66)	4(7.55)	7(13.2)	17(32.08)	22(41.5)	2.04	0.247
33.	Engineering Design and Working Drawing	27(50.94)	15(28.3)	5(9.4)	5(9.4)	1(1.89)	4.17	0.477
34.	Screw Thread, Fasteners and Devices	25(47.12)	15(28.3)	6(11.32)	4(7.55)	3(5.66)	4.6	0.397
35.	Engineering Working Drawings	24(45.28)	13(24.52)	7(13.2)	5(9.4)	4(7.55)	3.53	0.399
36.	Sections and Sectional Views	25(47.12)	13(24.52)	7(13.2)	3(5.66)	5(9.4)	3.94	0.411
37.	Computer Aided Drawing (CAD)	7(13.2)	17(32.08)	3(5.66)	19(35.84)	7(13.2)	2.96	0.293
38.	Blue Print Reading	4(7.55)	16(30.18)	5(9.4)	23(43.39)	5(9.4)	2.83	0.287
	Business Opportunities in Drawing Studio Practice							
39.	Reading for construction and	10(18.87)	25(47.17)	2(3.77)	13(24.52)	3(5.66)	3.49	0.375

	Production Industries							
40.	Blue Print Reproduction Services	12(22.64)	23(43.4)	3(5.66)	9(16.98)	6(11.32)	3.49	0.375
41.	Drawing Equipment and Materials Merchandising	-	-	-	19(35.84)	34(64.15)	1.36	0.113
42.	Computer Aided Drawing and Training Services	22(41.51)	23(43.40)	2(3.8)	1(1.89)	3(5.66)	4.28	0.487

Key: VD = Very Difficult; D = Difficult; M = Moderate; E = Easy; and VE = Very Easy, ND = Not Difficult

Table 1 unveiled that twenty five items that is, 60.47% among the topics listed for the study in the table including items 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12, 13 , 14, 15, 16, 17, 19, 20, 25, 29, 30, 32, 37, 38 and 41 were perceived as easy topics by the students. The mean ratings of the twenty-five topics fell below 3.0, which is the cut-off point. On the other hand, seventeen items which is 39.53% of the topics listed for the study including items 11, 18, 21, 22, 23, 24, 26, 27, 28, 31, 33, 34, 35, 36, 39, 40 and 42 were perceived as difficult topics to learn by the students with the mean ratings above 3.0 the cut-off point, indicating that these topics were difficult to learn by the students.

HO1: There is no significant difference in the perceived difficult topics in technical drawing curriculum by male and female school of science students in Ibadan metropolis.

Table 2: t-test on the Perceived Difficult Topics in Technical Drawing Curriculum by Male and Female Students in Oyo State School of Science in Ibadan Metropolis

		Levene's Test for Equality of Variance		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	T	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
SCORES	Equal Variances assumed	.003	.967	127	52	.896	.41008	2.91727	-.543522	6.43713

Table 3 revealed that the Sig. (2-tailed) value is 0.896 which is greater than .05 level of significance. This implies that there is no significant difference in the perceived difficult topics in technical drawing curriculum by male and female students of school of science in Ibadan metropolis. Hence, the hypothesis is not rejected.

7.0 DISCUSSION

The findings of the study therefore unveiled that 39.53% of topics in the technical drawing curriculum were perceived as difficult while 60.47% were identified as easy or less difficult topics. The results of the finding agrees with the findings by Wordu (2019)

whom in his study equally discovered that out of the 19 items provided in the Technical Drawing Curriculum, three items were perceived as less difficult, nine items were perceived as moderately difficult and seven items were perceived as very difficult. Wordu further describes the levels of difficulty as becoming higher with the latter items in the orderly arrangement of the curriculum as indicated in the findings of the study. In addition, the study revealed no significant difference in the perceived difficult topics in technical drawing curriculum by male and female students of school of science in Ibadan metropolis. This in line with the findings by Adebisi et al (2023) who reported that male and female students and teachers had similar perception on difficulty levels of Biology topics; and Taangahar & Okwori (2022) who discovered in their study that students' perception of difficult concepts in physics does not significantly differ based on gender.

8.0 CONCLUSION

The study established that seventeen topics including Tangents and Tangency; Introduction to Computer Graphics; True Shapes; Intersection of Solids; Perspective Drawing; Auxiliary Views of Geometrical Solids; Traces of a Point and Line in Space; True Lengths and Angles of a Line in Space, and Planes and Views in Space; Details of parts of Building; Engineering Design and Working Drawing; Screw Thread, Fasteners and Devices; Engineering Working Drawings; Sections and Sectional Views; Reading for construction and Production Industries; Blue Print Reproduction Services; and Computer Aided Drawing and Training Services in the technical drawing curriculum contents were perceived by the students as difficult topics. More so, it was also concluded that male and female students of school of science in Ibadan metropolis had similar perception on the difficulty level of technical drawing topics in the curriculum.

9.0 RECOMMENDATIONS

The following recommendations were made based on the findings of the study:

a) The government should through Ministry of Education organize and encourage technical drawing teachers to participate in refresher courses, workshops and conferences on a regular basis in a bid to update and enhance teachers pedagogical knowledge and skills. .
b) Professional bodies like Annals of Technology Education Practitioners Association of Nigeria (ATEPAN), Association of Vocational and Technical Educators of Nigeria (AVTEN), and National Educational Research Development Council (NERDC) should support technical drawing instructions with appropriate teaching modules/guides, relevant and appropriate textbooks and instructional materials among others for the purpose of assisting teachers overcoming and simplifying what the students perceived as difficult topics.
c) Efforts should be made by the government and its agencies, as well as the school administrators to encourage teachers to employ positive attitudes towards the students, combine learning and teaching strategies that actively involve students in their learning and engage in regular revision exercise with the students. This would to a large extent ensure mastery and retention of the materials learnt as well as raising the levels of students' perception on difficult level of technical drawing topics.

d) Teacher should opt for and consider suitable effective pedagogical strategies that exploit new teaching resources. In this case, innovative software technologies could be used for expanding possibilities of pedagogical effectiveness and used for improving students' spatial ability through their hobby. The use of video games' playing may help to develop the imagination skill of students in rotations of 2D and 3D objects thus improving the development of spatial skills.
e) A well-equipped drawing studio with modern drawing facilities and instructional materials should be procured for teaching and learning of technical drawing in the state school of science by the authority in charge such as the state government and its agencies, as well as the school administrators.
f) Gender discrimination should not be entertained to afford students equal opportunity and learning experiences as the study revealed similar perception of difficulty in the nature of technical drawing topics.

10.0 ACKNOWLEDGEMENTS

The author(s) appreciate the Principal, Vice Principals, Head of Departments, the entire members of staff and final year students who participated in the study for the opportunity granted and enabling environment created for the study.

11.0 REFERENCES

Abd-El-Aziz, A. A. Jimoh, J. A., & Hassan, A. M. (2020). Identification of Basic Technology Difficult Topics as Perceived by Upper Basic Education Teachers and Students in Ibadan Metropolis. e-Academia Journal, 9(1), 24 - 32. http://journale-academiauitmt.uitm.edu.my/v2/index.php/home.html

Adebisi, N. A., Akanbi, O. A. & Yusuf, A. A. (2020). Difficulty Levels of Senior School Physics Concepts as Perceived by Students and Teachers in Ilorin, Kwara State, Nigeria. FUDMA Journal of Educational Foundations (FUJEF), 3(2), 11 – 19. https://www.semanticscholar.org/journal.fudutsinma.edu.ng

Akanni O. (2015). An Investigation of Difficult Topics in the Senior Secondary School Mathematics Curriculum as Perceived by Student Teachers. American Journal of Educational Research, 3(7), 844-848. https://www.semanticscholar.org/paper/AnInvestigation-of-Difficult-Topics-in-the-senior-Olubukola/c6928afe00fbbb.

Alada, H. & Bekdaú, H. D. (2018). Challenges of "Teaching and Learning" in Technical Drawing Course: A Comparison of Architectural and Civil Engineering Education. Journal of Teaching and Education, 8(2), 1–12. https://www.universitypublications.net.

Amusa J. O. (2019) Diagnosing and Remediating Students' Perceived Difficult Topics in Secondary School Physics. Niger Delta Journal of Education, 2(2), 153 – 170. https://www.researhgate.net/publcations.

Aniaku, O. L. & Nwankwo, A. L. (2024). Students' Perceived Difficult Topics in Secondary School Biology Curriculum: Causes and Solutions. International Journal of Studies in Education, 20(3), 145 – 153. https://ijose.unn.edu.ng

Babayemi, J. O., Akpan, I. F. & Emah, J. S. (2018). Investigating Difficult Concepts in Basic Science and Technology Curriculum for Solving Energy and Power

Problems for Sustainable National Developments. CARD International Journal of Educational Research & Management Technology 3(1), 11-17. https://www.casirmediapublishing.com

Chukwuemeka, I. P. & Dorgu, T. E. (2019). Students' Perceptions of the Difficult Topics in Biology at Senior School Level in Delta State, Nigeria. Journal of Advances in Education and Philosophy, 3(2), 62 – 66. https//www.saudijournals.com/media/articles/JAEP

Da Silva, I. B. & Agostinho, O. L. (2018). A Strategy for Teaching and Learning Technical Drawing. International Journal of Engineering Education, 34(6), 1939–1950. `https://www.researchgate.net/publication/329017552_A_strategy_for_teaching_and_learning_technical_drawing

Directorate General of Training, Ministry of Skill Development and Entrepreneurship, Government of India (2019). Engineering Drawing (Common for All Engineering Trades) 1st Year (Volume I of II) National Skill Qualification Framework (NSQF). National Instructional Media Institute. https://www.coursehero.com/file/129168810/Engineering

Etobro, A. B. & Fabinu, O. E. (2017). Students' Perceptions of Difficult Concepts in Biology in Senior Secondary Schools in Lagos State. Global Journal of Educational Research, 16, 139-147. www.globaljournalseries.com

Hadebe, L. B. & Lincolyn, M. (2022).Practical Pedagogy as an Infinite Solution for All Generations' Developmental Challenges. Journal of Effective Teaching Methods (JETM), 1(2), 14-20. https://journals.eikipub.com/index.php/jetm/inde

Hassan, B. & Maizam, A. (2017). The Imperatives of Technical Drawing Skills in Teaching TVET Subjects: The Case of Nigeria. Journal of Education and Practice, 8(23), 133 – 135. https://www.academia.edu/92882577/The_Imperatives_of_Technical_Drawing_Skills_in_Teaching_TVET_Subjects_The_Case_of_Nigeria?uc-g-sw=70255043

Jamilu M. C. (2015). Technical Drawing/Graphic Skills Acquisition for Teaching and Learning and Challenges in Technology Education. ATBU, Journal of Science, Technology & Education (ATBUJOSTE), 3(3). https://www.researchgate.net/publication/307971425

Makgato, M. & Khoza, S. D. (2016). Difficulties of Student Teachers in the Engineering Graphics and Design Course at a South African University: Snapshot on sectional drawing. Eurasia Journal of Mathematics, Science & Technology Education, 12(4), 703 – 715. https://www.ejmste.co/download/difficulties-of-student-teacher

Marwa, N. J., Choji, J. & Dalumo, B. D. (2020). Improving Spatial Ability Skills of First-Year Students in Basic Engineering Drawing Using a Solid Pair Model. Open Journals of Educational Development (OJED), 1(2), 1–12. https://www.openjournalsnigeria.org.ng/journals/index.php

Mohammed, A. O. & Jimoh, S. A. (2022). Perceived Difficult Topics and Senior Secondary School Students' Academic Achievement in Economics in Lagos State. Albukhary Social Business Journal, 3(2), 83 – 94. https://www.asbj.aiu,edu.my/images/Vol3Issue2Dec2022

Moses, O. (2019). An Appraisal of Teacher/Student Acceptance and Satisfaction with the Use of CAD Package as Compared to Conventional Method for Teaching Technical Drawing at Secondary School Level in Lagos State. International Journal of Educational Research (IJER), 6(1) 82 – 90. Retrieved from https://www.ajol.info/index.php/ijer/article/view

Mohammed, V. O. (2021). Students' and Teachers' Perspectives on the Learning of School Science in Lagos, Nigeria. Thesis submitted for the Doctor of Philosophy UCL Institute of Education.

https://discovery.ucl.ac.uk/id/eprint/10122148/7/Mohammed_10122148_Thesis_sig_removed.pdf

Moyo, C. (2018). Investigating the Areas of Student Difficulty in Chemistry Curriculum: A Case Study in Qatar. Texila International Journal of Academic Research, 5(2), 1 – 8. https://www.texilajournal.com DOI:10.21522/TIJAR..2014.05.02.Art003

Nartey, E. & Hanson, R. (2022). The Perceptions of Senior High School Students and Teachers about Organic Chemistry: A Ghanaian Perspective. Science Education International 32(4), 331 - 342. Retrieved from https://www.researchgate.net/publication/356688353_The_The_Perceptions_of_Senior_High_Schools_and_Students_and_Teachers.

Nurdin, H., Ambiyar & Nurhasansyah (2023). Effect of Learning Outcomes on the Use of Modules in Technical Drawing. Books of Proceedings of the 9th International Conference on Technical and Vocational Education and Training (ICTVET), 84 – 95. https://doi.org/10.2991/978-2-38476-050-3_10 https://www.atlantis-press.com/proceedins/ictvet-22/125986367

Ogunkola, B. J. & Samuel, D. (2011). Science Teachers' and Students' Perceived Difficult Topics in the Integrated Science Curriculum of Lower Secondary Schools in Barbados. World Journal of Education, 1(2), 17 – 29. https://files.eric.ed.gov/fulltext/EJ1159068.pdf.

Oladejo, A. I., Ademola, I. A., Ayanwale, M. A. & Tobih, D. (2023). Concept Difficulty in Secondary School Chemistry – An Intra-Play of Gender, School Location and School Type. Journal of Technology and Science Education 13(1), 255 - 275. https://www.joste.org/index.php/joste/article

Olaoye, A. O. & Adameji, J. O. (2023). Challenges of Virtual Learning in Teaching Technical Drawing Among Technical Education Students of Ekiti State University. Journal of Contemporary Issues in Education (EKSUJCIE), 7(1), 36 – 45. Retrieved from https://www.eksujcie.com/vol-17/&ved=2ahUKEwiP

Olawumi, A. C. & Oyebola, A. S. (2020). Difficult Concepts in Nigerian Senior Secondary School Mathematics Curriculum as perceived by students. Ilorin Journal of Education (IJE), 40, 114 – 124. https://www.ije.unilorinedu.sch.ng/index.php/ije/article/view/26

Onoselease, A. G. & Ejodamen, I. F. (2018). Factors Militating Against the Teaching and Learning of Technical Drawing in Technical Education in Public Nigerian Universities. International Journal of New Technology and Research (IJNTR), 4(2), 67-72. https://media.neliti.com/media/publications/263135-factors-militating-against-the-teaching-154cc760.pdf

Taangahar, B. A. & Okwori, A. (2022). Physics Students' Perception of Physics Concepts as Difficult and the Perception of their Performance in the Subject in Benue State, Nigeria. Village Math Educational Review (VER), 4(1): 16-25. https://ngsme.villagemath.net/journals/ver/v4i1/taangahar-okwori

Udousoro, U. J. (2011). Perceived and Actual Learning Difficulties of Students in Secondary School Mathematics. African Research Review: International Multidisciplinary Journal, Ethiopia, 5 (5), 22, 357-366. DOI: http://dx.doi.org/10.4314/afrrev.v5i5.28

Wordu, H. (2019). Identification of Topics of Difficulty in the Technical Drawing Curriculum by Electrical and Electronics Students in the Technical Colleges in Rivers State, Nigeria. International Journal of Research in Engineering, Science and Management (IJRESM), 2(8): 192 – 196. www.ijresm.com/Vol.2_2019/Vol2_Iss8_August2019/IJRESM-V2_18_53.pdf.