



Original Research Report

Application of Computer Aided Design (CAD) and Flat Techniques in Teaching Pattern Drafting by Clothing Lecturers in Universities in South East, Nigeria

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Abstract: The purpose of the study was to investigate the application of computer aided design (CAD) and Flat techniques in teaching pattern drafting by clothing lecturers in Universities in South East, Nigeria. The population for the study was 48 lecturers. The entire number of Clothing lecturers in the above three universities were used because of the manageable size. A questionnaire was utilized for data collection (0.94 Cronbach's alpha). Data collected were analyzed using mean and standard deviation. The major findings of the study showed that some of the challenges in the application of CAD and Flat instructional techniques in teaching pattern drafting include lack of skills on the part of the teachers, insufficient numbers of computers and insufficient technical support for teachers, among others. Orientation of teachers on the importance of computer aided design instruction, using blended approach in teaching, and use of another pattern drafting technique among others are strategies to overcoming the challenges of CAD and Flat technique of pattern drafting instruction by Clothing Lecturers. Among the recommendations made was that curriculum planners and lecturers should make effort to adopt the use of CAD as one of the instructional techniques in teaching pattern drafting.

Keywords: CAD, Clothing, Flat drafting, Pattern Drafting, Techniques

1. Introduction

Clothing is one of the basic needs of man. From the beginning of man's creation, clothing provides functions such as protection, identification, beautification, adornment, modesty, and status. Clothing refers to all things worn or applied to the skin or the human body to fulfil its function. Idowu (2016), noted that clothing refers to that which is used by men and women to cover their body which are made from various kinds of materials. Textile is also any materials made by interlacing of fibers (Idowu, 2016). Textile fibers are processed into fabrics and sold to make clothing. Clothing and Textiles is an aspect of Home Economics which prepares its students for employment opportunities in occupations such as clothing selection, clothing construction, costume designing, clothing care, craft work, clothing economics, among others (Anyakoha & Eluwa, 2015). According to Komolafe (2016) Clothing and textiles provides the individuals with knowledge and skills in such areas as wardrobe planning, consumer education, creative use of available resources, sewing equipment, textile fibres and fabrics, basic and advanced techniques of garment construction, pattern drafting, designing and care. It exposes the students to practical work so as to be well equipped with saleable skills required for self-reliance and good quality life (Okoh & Nkwodimmah, 2014). Clothing and textile courses taught in Universities in South East Nigeria are done at different levels which involves theory and practical. The theory contents are taught in all the courses in Clothing and textiles likewise the practical aspect. Among all the courses taught in clothing and textile, pattern drafting is one of them.

Pattern drafting is referred to as the blueprint for designing. It is the drafting of measurement of different body parts on paper to make a well fitted garment. According to Anikweze (2012), pattern drafting is the art of designing the outline of the plan or arrangement for sewing a cloth. According to Igbo and Iloeje (2012) and Ajunwa (2015), pattern is a piece of paper drafted and cut to size and shape, used for cutting out fabric pieces for making garments. Pattern drafting is a technical approach to pattern production, using body figure measurements while following a set of instructions whereby the instructions are interpreted into drawings or shapes on paper or fabric. Pattern drafting is the process of creating a pattern piece using measurements taken from an individual, a body form or a pre-existing garment and with these collected measurements, the pattern is drawn directly onto paper (Shalini & Rajeev, 2017). Pattern drafting is usually offered by second- and third-year students in the Universities with the following course contents; Basic block pattern bodice, skirts and sleeve,

pattern adaptation processes, manipulation of darts, creation and control of fullness, sleeves and collars which entail more of practical work with little theory. For a fabric to be sewn into a cloth, there are different techniques that are involved in drafting pattern pieces. These are referred to as pattern drafting techniques.

Technique is a skilful or efficient way of doing or achieving something. According to Nahid, Ahmmadreza and Roya (2018), technique is a well-defined procedure used to accomplish a specific task or activity. Techniques involved in pattern drafting include modelling, knock-off design, pattern grading (modifying from a set of patterns), computer aided pattern drafting and the flat pattern techniques (Igbo & Iloeje, 2012). The study is interested in two techniques, they include flat pattern drafting and computer aided design (CAD). Flat pattern drafting technique is manually oriented and it is not automatic, computerized, or digital in nature, rather, it is achieved using manual processes. The processes involved in flat pattern drafting techniques adopts the use of metre rule, T-square, French curve, table, pencil, eraser and scissors to make up lines, slashing, spreading which involves calculations. According to Onyeazor (2019), the skills involved in Flat Pattern drafting include measuring, drawing, shaping, slashing, spreading and drafting which are used to develop basic blocks such as front bodice, back bodice, front skirt, black skirt and sleeve. Computer Aided Design (CAD) is automatic and digital in nature. CAD uses computer device and design software to draft a pattern. According to Imayanti and Yahya (2018), computer aided design (CAD) is a tool that plan, model, and evaluate a product accurately before it is manufactured. Different types of CAD software that are available in the market for the use in the Apparel industry are Design CAD system. Body Scanning & Measurement, Digitizing, Pattern Design & Grading, Marker Making, 3D Fit, Texture Mapping, Embroidery, Design Specification, Data Management, 3D Visual Merchandising (Jevsnik et al., 2012). The study will adopt the Pattern Design and Grading which uses tools such as the offset, mirror, copy, trim, join, scale, line among others to draft.

Pattern drafting is one of the courses taught in Clothing area which equip students with skills that will make them self-reliant but due to difficulty encountered in this course, students seem to develop lukewarm attitudes towards the course. A study by Arubayi and Obunadike (2011) has shown that students' interest in Clothing and Textiles as a subject is low as students of Home Economics have been reported to have lower grades in pattern drafting courses as regards performance when compared to other areas of Home Economics. This may be attributed to pattern

drafting techniques adopted by clothing and textile lecturers which may be consuming a lot of time as students have other courses contending for their time within their programme. Apart from the time factor, students often experience fear about the complex processes involved in drafting patterns (Imayanti & Yahya, 2018). As a result of these challenges, students often lose interest (in mild cases) and some develop phobia (in serious cases) and these in turn make the students to have very low level of achievement as far as pattern drafting is concerned (Okoh & Nkwodimmah, 2014). Instructional techniques adopted by teachers during instruction in pattern drafting make students lose interest in classroom learning, achieve lower grades, and consequently may ultimately reduce students' enrolment in that subject area in higher degrees in terms of academic institutions (Abdulkamid, 2010). Teacher should adopt effective method of instruction or find ways to make the instruction interesting to the students. Some of the strategies to make a lesson interesting are by using blended approach, satellite centres, the post, teacher training, and video/conference among others. Teaching or instruction is an academic construct that involves the art of inculcating in students, a sense of curiosity about a concept, and in addition, enhancing the skills necessary to strengthen this curiosity (Duruji et al., 2014). Instruction involves the use of well-vetted strategies to expose students to learning opportunities needed to promote healthy development and transferable learning as well as help educators respond to individual variability, address adversity, and support resilience (Darling-Hammond et al., 2020). It is expected that if effective instructional technique is adopted by teacher, the application of both CAD and Flat pattern drafting techniques will improve student achievement, interest and retention in teaching and learning of pattern drafting.

1.1. Statement of Problem

Flat pattern drafting technique has been the major method employed by lecturers in teaching and learning of pattern drafting in South East, Nigeria. It provides blocks that will be manipulated to different designs, and this method is inexpensive if compared to other methods used manually. Notwithstanding the advantages flat method holds over other manual driven method. It also comes with some weaknesses such as time consumption as there are many processes involved in drafting a pattern.

1.2. Purpose of the Study

The general purpose of this research is to investigate the application of computer aided design (CAD) and Flat techniques in teaching pattern drafting by clothing lecturers in Universities in South East, Nigeria. Specifically, the objectives of the study include to:

- (a) challenges encountered in the application of computer aided design (CAD) and Flat techniques in teaching pattern drafting by clothing lecturers
- (b) effective ways to overcome the challenges encountered in the application of computer aided design (CAD) and Flat techniques in teaching pattern drafting by clothing lecturers.

1.3. Research Questions

The following research question guided the study:

- (a) What are the challenges encountered in the application of Computer Aided Design (CAD) and Flat techniques in teaching pattern drafting by clothing lecturers?
- (b) What are the effective ways to overcome the challenges encountered in the application of computer aided design (CAD) and Flat techniques in teaching pattern drafting by clothing lecturers?

2. Materials and Methods

2.1. Design for the Study

The study adopted a descriptive survey design. Descriptive survey research design is used for those studies which aim at collecting data and describing in a systematic manner the characteristics, features or facts about a given population (Nworgu, 2015).

2.1.1. Ethics Statement

This research was ethically cleared by the Research Ethics Committee of the Department of Home Economics and Hospitality Management Education, University of Nigeria, Nigeria. All respondents provided informed consent verbally before completing the study instrument.

2.2. Area of the Study

This study was carried out in all the Universities in the South East, Nigeria that offer Home Economics Education in which Clothing and Textile is one of the courses taught. In South Eastern geopolitical zone of Nigeria, there are three Universities that offer Clothing and textile. These Universities are the University of Nigeria, Nsukka, Michael Okpara University of Agriculture,

Umudike and Ebonyi State University, Abakaliki. The South Eastern geopolitical zone was chosen because the area is made up of universities that teach Clothing and Textile courses and many students offer the course in the area.

2.3. Population and Sample

The population for this study was 48 lecturers. The paper is made up of all clothing lecturers of University of Nigeria, Nsukka (UNN), Michael Okpara University of Agriculture, Umudike (MOUUAU) and Ebonyi State University, Abakaliki (EBSU). The population was therefore made up of 23, 18 and 7 lecturers in UNN, MOUUAU and EBSU respectively, (Personnel Department of the institutions, 2020) making a total of 48 lecturers. The entire number of clothing lecturers were used because of the manageable size.

2.4. Instrument for Data Collection and Study Procedure

Questionnaire was used in answering research questions titled Challenges and Solutions of Computer Aided Design and flat techniques Questionnaire (CASCADAFTQ). The questionnaire was made up of two parts. Part 1 which elicited information from the respondents on their demographic data, and Part 2 which was made up of two sections – section A and section B. Section A elicited information on the challenges of computer aided design (CAD) and flat techniques in teaching and learning of Pattern drafting, while, Section B sought information on the effective strategies needed to solve this challenge of CAD and flat techniques instruction. Both Sections were structured on a four – point response options of Strongly Agree (SA), Agree (A), Disagree (D) and Strongly Disagree (SD)

2.4.1. Validation of the Instrument

The instrument was validated by three experts. The experts' comments and suggestions were used in modifying the questions and items.

2.4.2 Reliability of the Instrument

The Reliability of the instrument (CASCADAFTQ) was subjected to Cronbach's Alpha reliability method to determine the internal consistency which yielded a coefficient of 0.94.

2.5. Data Collection Technique

The administration and retrieval of the CASCADAFTQ questionnaire was carried out by the researcher with the help of two research assistants. Forty-eight copies of the questionnaires were administered on the clothing lecturers which was retrieved two weeks after administration.

2.6. Data Analysis Technique

Data collected was analyzed using mean and standard deviation to answer research questions. Decision on research questions were taken based on real limits of numbers. Thus, mean rating of 2.50 and above were considered as agreed, while items with mean rating below 2.50 were considered as disagreed. Consequently, any item with a mean range of 0.50 – 1.49 was interpreted as strongly disagree, any item with a mean value ranging from 1.50-2.49 was regarded as disagree, any item with a mean value ranging from 2.50-3.49 was regarded as agree, while an item with a mean value of 3.50 and above was interpreted as strongly agree.

3. Results and Discussion

3.1. Research question one: What are the challenges encountered in the application of Computer Aided Design (CAD) and Flat techniques in teaching pattern drafting by clothing lecturers?

Table 1: Mean and Standard Deviation Analysis of the Challenges Encountered in the Application of CAD and Flat Techniques of Pattern Drafting techniques by clothing Lecturers

S/N	Challenges Encountered in the Application of CAD Techniques	\bar{X}	SD	Decision
1	Lack of skills on the part of the teachers	3.66	0.72	SA
2	Insufficient number of computers	3.66	0.52	SA
3	Insufficient technical support for teachers	3.50	0.58	SA
4	Non-provision of ICT practical equipment or lab by the school	3.44	0.58	A
5	Inadequate number and training of ICT skilled staff	3.60	0.49	SA
6	Difficulty in integrating ICT use into the curriculum	3.28	0.93	A
7	The inability of the teacher to effectively use ICT tools in teaching	3.40	0.70	A
8	Problem of power supply	3.48	0.61	A
9	Lack of confidence in the use of ICT in the classroom	3.22	0.74	A
10	Exorbitant price of software and hardware resources	3.16	0.74	A
11	Lack of time to experiment with new technologies	3.22	0.86	A
12	Negative attitude and resistance to change	3.12	0.82	A



13	Lack of internet services	3.24	0.69	A
14	Unavailability of pattern drafting software due to cost	3.24	0.66	A
	Total	3.37	0.69	A
Challenges Encountered in the Application of Flat pattern Techniques				
15	Too many processes involved in pattern drafting	3.34	0.75	A
16	Difficulty in achieving precision in drafting	3.30	0.79	A
17	Costly in terms of providing the drafting items	3.20	0.88	A
18	Flat method takes time	3.36	0.75	A
19	Too many calculations involved in flat method	3.32	0.71	A
20	Some of the clothing lecturers lack pattern drafting skill	3.28	0.83	A
21	Few competent staff in the area of pattern drafting method	3.36	0.78	A
22	Student's interest is low in pattern drafting	3.30	0.61	A
23	Performance of students are poor in pattern drafting	3.14	0.70	A
	Total	3.29	0.76	A

Note: \bar{X} = Mean, SD = Standard Deviation

Data presented in Table 1 reveals that items 1, 2, 3 and 5 had a mean, ranging from 3.50-3.66. This implies that lecturers of Clothing strongly agree that lack of ICT skills, insufficient number of computers, insufficient technical support and inadequate ICT training staff are the challenges encountered in the application of CAD instructional techniques in teaching. Moreover, items 4, 6-14 had a mean, ranging from 3.12-3.48 which signifies that Clothing lecturers agree that non-provision of ICT equipment, difficulty in integrating ICT into the curriculum, inability of the lecturers to use ICT, poor power supply, lack of confidence in the use of ICT, among others are the challenges in the application of CAD instructional techniques in teaching pattern drafting. The Table further revealed that items 15-23 had the mean range of 3.14-3.36 which shows that lecturers of Clothing agree that too many processes in pattern drafting, difficulty in achieving precision in pattern, costly drafting items, too many calculations in pattern drafting, lack of pattern drafting skills, among others are the challenges encountered in the application of flat pattern instructional techniques in teaching pattern drafting.

The findings of the study revealed 14 challenges encountered in the application of CAD

techniques by Clothing lecturers. Some of the challenges include lack of skills on the part of the teachers, insufficient numbers of computers and insufficient technical support for teachers. Others include non-provision of ICT practical equipment or laboratory by the school, inadequate number and training of ICT skilled staff and difficulty in integrating ICT into the curriculum. This is in line with Abusomwan and Osaigbovo (2020) who stated that unavailability of pattern drafting software due to cost, lack of time to experiment with new technologies and problem of power supply are some of the hindrances to the adoption of CAD technique of pattern drafting.

The study also revealed 10 challenges encountered in the application of flat technique of pattern drafting by Clothing lecturers. Some of them include too many processes involved in pattern drafting, difficulty to achieve precision in drafting, flat technique being costly in terms of providing the drafting items and flat technique takes time. Report from Kareem (2015) is supported by this study. Kareem (2015) stated that too many processes in pattern drafting, poses difficulty in achieving precision in pattern. Too many calculations in pattern drafting, lack of pattern drafting skills, among others are the challenges encountered in the application of flat pattern instructional technique in teaching pattern drafting.

3.2. Research question two: What are the effective ways to overcome the challenges encountered in the application of computer aided design (CAD) and Flat techniques in teaching pattern drafting by clothing lecturers?

Table 2: Mean and standard deviation analysis of the strategies to overcome the challenges encountered in the application of cad and flat techniques of pattern drafting instruction by clothing lecturers

S/N	Strategies for Overcoming the Challenges of CAD Techniques	\bar{X}	SD	Decision
1	Orientation of teachers on the importance of Computer Aided Design instruction	3.74	0.49	SA
2	Using blended approach in teaching	3.38	0.60	A
3	Use of team teaching in pattern classes	3.46	0.58	A
4	Training teachers on the use of ICT	3.58	0.54	SA
5	Using of video lectures/conference	3.36	0.78	A
6	Organizing workshop for staff on the ICT usage	3.48	0.61	A



7	Seeking fund from the government to source for pattern drafting software	3.46	0.54	A
8	Seeking fund from TET fund to train staff on the use of ICT	3.28	0.64	A
9	Seeking assistance from philanthropist to assist in providing computers	3.04	0.90	A
10	Having positive attitude towards the use of ICT	3.54	0.65	SA
Total		3.43	0.63	A
Strategies for Overcoming the Challenges of Flat Techniques				
11	Using of another pattern drafting method	3.40	0.73	A
12	use of team teaching	3.36	0.53	A
13	periodical training for the teachers	3.38	0.75	A
14	Teachers should try and simplify the pattern drafting process while teaching	3.46	0.61	A
15	Teaching pattern drafting in the morning hour	3.10	0.86	A
16	Allotting enough time on the time table for effective practical in pattern drafting	3.46	0.65	A
17	Teachers being enthusiastic about the course	3.32	0.68	A
18	Teachers being present when the pattern is drafted by students to identify errors on time.	3.54	0.58	SA
19	Parents should support their children financially for them to participate in pattern drafting class	3.48	0.61	A
Total		3.39	0.67	A

Note: \bar{X} = Mean, SD = Standard Deviation

Table 2 shows that items 1, 4 and 10 had the mean values of 3.74, 3.58 and 3.54 respectively. This signifies that orientation of the lecturers, use of team teaching and positive attitude to ICT are strongly agreed by the respondents as the strategies that could be employed to overcome the challenges encountered in the application of CAD instructional techniques in teaching pattern drafting.

Similarly, items 2, 3, 5-9 had the mean values ranging from 3.04-3.48. This implies that the use of blended approach, use of team teaching, using video lectures, organizing workshop for lecturers, and seeking fund from the government among others are agreed by the respondents as the strategies to overcoming the challenges encountered in the application of CAD techniques in teaching pattern drafting. Item 18 had the mean value of 3.54 which signifies that the respondents strongly agree that

the presence of lecturers when the pattern is being drafted by the students is the strategy to overcome the challenges encountered in the application of Flat techniques in teaching pattern drafting. Items 11-17, and 19 had the mean values ranging from 3.10-3.48 (Table 2). This signifies that the use of another pattern drafting techniques, use of team teaching, periodic training of lecturers, simplification of pattern drafting process, and teaching pattern drafting during the morning hours, among others are agreed by the lecturers as the strategies to overcome the challenges encountered in the application of Flat techniques in teaching pattern drafting. Page | 39

The findings of the study revealed 10 strategies to overcoming the challenges of CAD technique of pattern drafting instruction by Clothing Lecturers. Some of them include: orientation of teachers on the importance of computer aided design instruction, using blended approach in teaching, use of team teaching in pattern drafting classes and training teachers on the use of ICT. This is in line with Kamau (2014) who stated that organizing workshop for staff on the ICT usage, orientation of teachers on the advantages of using CAD for teaching and seeking fund from TET Fund to train staff on the use of ICT are some of the ways of overcoming the challenges of using CAD for teaching and learning in higher institutions. The findings of this research agree with the findings of Makanda (2015), who documented that principal officers and head of departments should be organizing regular in-house workshops and seminars on the use of CAD in school systems. Such seminars will help the staff understand the usage of CAD as well as to know how to use various equipments in teaching of CAD.

The findings of the study also revealed nine strategies for overcoming the challenges of Flat technique of pattern drafting instruction by Clothing Lecturers. Some of them include: use of another pattern drafting technique, use of team teaching, periodical training for the lecturers and that lecturers should try and simplify the pattern drafting process while teaching. This is also in line with Buabeng-Andoh (2012) who stated that the challenges of teaching most practical courses could be reduced when lecturers try to simplify the practical process while teaching students and that lecturers should be enthusiastic about the teaching of the course to raise the spirit and interest of the students on their courses. The implication of this research is that school administrators must brace up efforts towards providing an enabling laboratory for the use of CAD and Flat techniques in teaching of pattern drafting by lecturers. This research is limited to the study area and by the small sample investigated which may not apply to other zones and schools. Future research must examine in other

regions what challenges these lecturers are facing and how they are tackling the challenges of using CAD and Flat techniques in teaching of pattern drafting. Future research must go beyond descriptive analysis and explore their lived experiences using qualitative phenomenological approach to research.

4. Conclusion

This study was to ascertain the application of computer aided design (CAD) and Flat techniques in teaching pattern drafting by clothing lecturers in Universities in South East, Nigeria. Specifically, the study seeks to determine the challenges encountered in the application of computer aided design (CAD) and Flat techniques in teaching pattern drafting by Clothing lecturers and the effective ways to overcome the challenges encountered in the application of computer aided design (CAD) and Flat techniques in teaching pattern drafting by clothing lecturers. Based on the findings, the study indicated some challenges observed in using the two methods (CAD and Flat) to teach pattern drafting. Also, the study reveals some strategies to observe in order to overcome the challenges. Based on the findings of this study, the following recommendations were made. The Ministry of Education, through Nigerian Universities Commission (NUC), should allocate more time for in-service training of Home Economics lecturers on integration of CAD and Flat techniques to empower them, thus enable its application effectively in the classroom. The government should provide adequate ICT infrastructure and equipment, including computer hardware and software and other materials such as brown paper, tables etc in all schools to aid the application of CAD and Flat techniques in teaching and learning of pattern drafting..

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Conflict of Interest

The authors declare that there is no conflict of interest.

Authors' Contributions

Conceptualization: BIU, MNE, BIA, UME, and ECE

Formal analysis: BIU, MNE, BIA, UME, and ECE

Funding acquisition: BIU, MNE, BIA, UME, and ECE

Investigation: BIU, MNE, BIA, UME, and ECE

Methodology: BIU, MNE, BIA, UME, and ECE

Data analysis: BIU, MNE, BIA, UME, and ECE

Writing – original draft, review & editing: BIU, MNE, BIA, UME, and ECE.

Data Availability Statement

The original contributions presented in the study are included in the article. Further inquiries can be directed to corresponding author.

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