Innovations

Effects of Two Techniques of Pattern Drafting (Flat and Cad) on the Academic Achievement, Interest and Retention of Home Economic Education Students of Universities in South-East Nigeria

Ugwu Eunice Ifenyinwa[1], Attah Blessing Ijeoma[1*], Gera Nguvan Patience[2], Ezeaku Margret Ndidiamaka[1],Ifeanyichukwu Obioma Irene[3], Emmanuel Chekwube Eze, Emeghebo Udochukwu M, Nwafor Eucharia Chinwendu & Eze Ngozi Mary[1]

[1]Department of Home Economics and Hospitality Management Education, University of Nigeria
[2]Department of Vocational and Technical Education Benue State University, Makurdi
[3]Anambra State Polytechnic Mgbakwu

*Corresponding Author: **Attah Blessing Ijeoma**

***Abstract :** The study investigated the effects of two techniques of pattern drafting (Flat and CAD) on the academic achievement, interest and retention of Home Economics Education students of Universities in South-East, Nigeria. The design of the study was pre-test, post-test and retention test quasi experimental design. The study was conducted at public universities in the South-East, Nigeria. Three research questions and three null hypotheses guided the study. The population for the study was 58 undergraduate students comprising of second and third year students from three public universities that offer Home Economics Education. (26 from University of Nigeria, 28 from Micheal Okpara University of Agriculture Umudike and 4 from Ebonyi State University). The instrument used for data collection was pattern drafting techniques achievement test (PDTAT). The instrument had three versions: pre-test, post-test and retention test which were the same except for the reshuffling and swapping of the questions and options of the 40 objective questions used for the study. The instruments were subjected to face and content validation. Five experts validated the instruments. The reliability coefficient using Kuder Richardson (K-R 20) was 0.78. The reliability test was conducted using 20 students from Delta state university. The data was collected with the aid of two research assistants. Data collected for the study were analyzed using*

mean with standard deviation to answer the research questions. Analysis of covariance (ANCOVA) was used to test the null hypotheses at 0.05 level of significance. The major finding of the study among others was that students taught with CAD have a better academic achievement, interest and retention when compared to those taught with Flat method. There was statistically significant difference (F=24.71, P = 0.00<0.05) between the mean academic achievement, (P>0.05) the mean interest and (P<0.05) the mean retention of Home Economics Education students that were taught through CAD and those that were taught through Flat pattern drafting techniques. Based on the finding, it was recommended that the curriculum planners should inculcate in the curriculum the use of CAD and lecturers should adopt the use of CAD during teaching and learning of pattern drafting.

Keywords: *Home Economics, pattern drafting techniques, achievement, interest, retention.*

Introduction:

Home Economics is a field of study that helps to develop knowledge, skills and attitudes in the life of an individual. According to Bala, Oghenejabor, Unogu, Abdullahi and Akande (2015), Home Economics is concerned with improving the quality of life, enriching individual, family and community with skills to be self-reliant. It is skill oriented. It helps to equip the students with entrepreneurship skills for self employment. Home Economics is offered at all levels of Education in Nigeria. One of the areas of the study that is taught at undergraduate level is clothing and textile.

Clothing and textiles is an aspect of Home Economics which prepares students for employment opportunities in clothing selection, clothing construction, costume designing, clothing care, craft work and clothing economics (Anyakoha & Eluwa, 2015). According to Komolafe (2016) clothing and textiles provides the individuals with knowledge and skills for 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 and equipped them with saleable skills required for self-reliance. (Okoh & Nkwodimmah, 2014).

In the Universities in South-East Nigeria, both the theory and practical aspects of clothing and textile courses are taught. Pattern drafting is one of the taught courses in clothing and textile. Pattern drafting is the blueprint for designing. It is the drafting of measurement of different body parts on paper in order to make a good and well fitted garment. Ajunwa (2015) opined that pattern drafting is the process of creating a pattern by taking measurements from a person to form a model

which is transferred on a paper in order to create a foundation for sewing. 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 methods that are involved in drafting pattern pieces. These are referred to as pattern drafting techniques.

Pattern drafting techniques include: modelling, knock-off design, pattern grading computer aided pattern drafting and the flat pattern techniques (Igbo &Iloeje, 2012). The study is interested in two techniques, which are computer aided design (CAD) and flat pattern drafting techniques. Flat pattern drafting techniques is manually oriented. It is not automatic. 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, back 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. Computer aided design (CAD) software uses many tools such as the offset, mirror, copy, trim, join, scale, line among others to draft. These tools in CAD software are used in drafting patterns more efficiently. It saves time. Onyeazor (2019) opined that it helps in achieving precision in pattern making.

Most Home Economics lecturers in Nigeria use Flat techniques to teach pattern drafting. The processes involved are rigorous, ranging from taking body measurement, dividing the body measurements to get fractions (Onyeazor, 2019). Transferring of body measurements into brown paper pose some level of difficulty especially when body measurement such as bust line, hip line, waist line, dart position, slashing and spreading has a decimal or uneven number, which could lead to bad fit on the wearer. During the teaching, most times, the instructions and guidelines given are not clear. Due to lack of clarity, it becomes difficult for students to understand and flow along. This can be quite stressful and limiting and can lead to energy sapping. Flat pattern drafting techniques consume a lot of time. A Study by Arubayi & Obunadike (2011) has shown that pattern drafting techniques can affects students' interest in Clothing and Textiles.

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 academic achievement in pattern drafting (Imayanti & Yahya, 2018). In teaching of pattern drafting, lecturers of Home Economics in Nigeria adopt the flat pattern drafting techniques due to the fact that they were taught using the same techniques. This is owing to the fact that computer aided pattern drafting is a novel pattern drafting techniques. As a result, some current Home Economics lecturers are yet to be taught how to utilise it in instruction. According to Onyeazor (2019), many lecturers of Home Economics are finding it difficult to update their instructional delivery skills such as the use of digital methods like the computer aided design pattern drafting instructional techniques. Insufficient knowledge on computer aided pattern drafting by Home Economics lecturers therefore tends to have a negative impact on classroom instruction of pattern drafting. Isukpa (2014) pointed out that the resultant effects of teachers' inability to update their knowledge to adopt the novel CAD classroom approach to ensure students' active participation leads to inability of some students to cope which discourage role memorization and make students lose interest and achievement in learning. Moreover, the inability of lecturers to update to CAD techniques could be attributed to unavailability of the software because of the cost. Therefore, the inabilities of both lecturers and students to use CAD affect technological advancement in teaching and learning in the University (Imayanti and Yahya, 2018). The emergence of ICTs in teaching and learning has presented both lecturers and students an opportunity to teach and learn using technology. Hence, the study seeks to investigate the effects of two techniques of pattern drafting (Flat and CAD) on the academic achievement, interest and retention of Home Economics Education students of Universities in the South-East.

Research Questions:
The following research questions guided the study:
1. What are the effects of two techniques of pattern drafting (Flat and CAD) on the academic achievement of Home Economics Education students of Universities in the South-East?
2. What are the effects of two techniques of pattern drafting (Flat and CAD) on the interest of Home Economics Education students of Universities in the South-East?
3. What are the effects of two techniques of pattern drafting (Flat and CAD) on the retention of Home Economics Education students of Universities in the South-East?

Hypotheses:

The following null hypotheses were tested at 0.05 level of significance:

Ho$_1$: There is no significant difference between the mean achievement scores of the Flat and the CAD techniques of instruction on pattern drafting of Home Economics Education students of Universities in the South-East.

Ho$_2$: There is no significant difference between the mean interest scores of the Flat and the CAD techniques of instruction on pattern drafting of Home Economics Education students of Universities in the South-East.

Ho$_3$: There is no significant difference between the mean retention scores of the Flat and the CAD techniques of instruction on pattern drafting of Home Economics Education students of Universities in the South-East.

Methods:

The design of the study was a quasi-experimental research design. The experimental design used non equivalent control groups involving pre-test, post-test and retention test design. The study was conducted at the public university in the south-east, Nigeria that offers Home Economic Education. The population for the study was 58 undergraduate students. The population for the study was grouped into experimental and control groups.

The sample for the study was 54, comprising 26 students of Home Economics Education in University of Nigeria, Nsukka and 28 students Michael Okpara University of Agriculture. Random sampling technique was used to select two out of three universities that offer Home Economics Education in South East Nigeria where all the students in the sampled schools were used as intact classes. The universities selected for the intact classes are University of Nigeria, Nsukka and Michael Okpara University of Agriculture. The classes were used as intact because the randomization of students into treatment and control groups would disrupt normal classes and introduce Hawthorne effect.

The instruments used for data collection was pattern drafting achievement test (PDAT). The pattern drafting achievement test was administered as pre-test, post test and retention test in a disguised manner. The post test was disguised from pre test by renumbering. The retention test was disguised from pre test and post test also by renumbering. The pattern drafting achievement test was 40 item instruments of multiple choice questions with four responses option A – D. The pattern drafting achievement test (PDAT) was subjected to face and content validations. Five experts validated the PDAT. The pattern drafting achievement test instrument was subjected to trial testing on students to ascertain the reliability of the instruments. The internal reliability co-efficient of the instrument was computed using Kuder Richardson formula 20 (K-R 20) and the reliability co-efficient of 0.78 was obtained.

Fifty-four pre- PDAT copies of the instrument were administered on students before the treatment which lasted for six weeks. At the end of the treatment, a post-PDAT was administered and two weeks after the post- PDAT, retention test was administered. Data collected for the study were analyzed using SPSS version 22. Mean with standard deviation were used to answer all the research questions. Analysis of covariance (ANCOVA) was used to test the null hypotheses formulated for the study at 0.05 level of significance. The decision rule is that if the calculated significant value is less than 0.05 significant level the null hypothesis will be rejected, but if it is equal or greater than 0.05 the null hypothesis is accepted.

Results:

Research Question 1: What are the effects of two techniques of pattern drafting (Flat and CAD) on the academic achievement of Home Economics Education students?

Table 1: Mean and Standard Deviation of the Two Techniques of Pattern Drafting (Flat and CAD) on the Academic Achievement of Home Economics Education Students

Teaching Techniques	Pre-test	SD	Post-test	SD	Gain	Difference
CAD	20.6	5.76	35.00	3.07	**14.40**	
FLAT	18.07	4.67	30.64	2.83	**12.57**	**1.83**
Gain	**2.53**	**1.09**	**4.36**	**0.24**		

Result presented in Table 1 shows that Home Economics Education Students taught pattern drafting using Computer aided design (CAD) had a pre-test mean score of 20.6 and a post-test mean score of 35.00 with a mean gain of 14.40 while the students taught pattern drafting using flat pattern drafting techniques had a pre-test mean score of 18.07 and a post-test mean score of 30.64 with a mean gain of 12.57. The mean gain score of students taught using CAD instructional techniques was greater when compared with the mean gain score of students taught pattern drafting instruction through flat pattern drafting techniques by 1.83. This implies that CAD instructional technique is more effective than the flat techniques in teaching pattern drafting. The result also shows that the mean post-test score of 4.36 for CAD techniques is greater than the mean pre-test score of 2.53 for Flat techniques. This also implies that Home Economics Education students learnt pattern drafting through both CAD and Flat techniques.

Hypothesis 1: There is no significant difference between the mean achievement scores of the Flat pattern drafting techniques and the CAD techniques of instruction on pattern drafting of Home Economics Education students

Table 2: ANCOVA Analysis of the Effect of CAD and Flat Techniques of Instruction on the Academic Achievement of Home Economics Education Students in Pattern Drafting

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	260.571[a]	2	130.285	15.058	.000	.376
Intercept	3370.251	1	3370.251	389.535	.000	.886
Pre-test	9.829	1	9.829	1.136	.292	.022
Instructional Methods	213.803	1	213.803	24.711	.000	.331
Error	432.599	50	8.652			
Total	57359.000	53				
Corrected Total	693.170	52				
a. R Squared = .376 (Adjusted R Squared = .351)						

Result presented in Table 2 shows that the difference in the performance of Home Economics Education students that received instruction through CAD and Flat pattern drafting techniques is statistically significant (p=0.00<0.05, F=24.71). The hypothesis which stated that there is no significant difference between the mean achievement scores of Home Economics Education students taught pattern drafting using Flat and CAD techniques of instruction is therefore rejected (p<0.05). Furthermore, a partial eta squared of 0.33 shows that there is a moderate effect and can be attributed to CAD instructional techniques.

Research Question 2: What are the effects of two techniques of pattern drafting (Flat and CAD) on the interest of Home Economics Education students?

Table 3: Mean and Standard Deviation Analysis of the Two Instructional Techniques of Pattern Drafting on the Interest of Home Economics Education Students

Teaching Techniques	Pre-test		Post-test		Gain	Difference
		SD		SD		
CAD	48.12	10.01	51.96	13.47	3.84	2.56
FLAT	50.14	9.42	48.86	8.83	-1.28	
Gain	-2.02	0.59	3.10	4.64		

Result presented in Table 3 shows that Home Economics Education students that received instruction in pattern drafting through CAD instructional techniques had a pre-test interest score of 48.12 ± 10.01 and a post-test interest score of 51.96 ± 13.47 with a mean gain of 3.84. Similarly, the students that received instruction in pattern drafting using Flat techniques has a pre-test interest score of 50.14 ± 9.42 and a post-test interest score of 48.86 ± 8.83 with a mean gain on -1.28. This implies that the interest of students in pattern drafting through CAD instructional techniques appreciated by 3.84 while the interest of students in pattern drafting through Flat techniques depreciated by -1.28. The result further shows that the interest of students increased by 2.56 in favour of CAD instructional techniques. The pre-test interest score of Home Economics Education students that received instruction through CAD and Flat pattern drafting techniques was -2.02 ± 0.59 while the post-test was 3.10 ± 4.64. This signifies that the interest of students increased after receiving instruction in pattern drafting using CAD.

Hypothesis 2: There is no significant difference between the mean interest scores of the Flat techniques and the CAD techniques of instruction on pattern drafting of Home Economics Education students in Universities in South East, Nigeria.

Table 4: ANCOVA Analysis of the Effect of Flat and CAD Techniques of Instruction of Pattern Drafting on the Interest of Home Economics Students

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	518.569[a]	2	259.284	2.136	.129	.079
Intercept	2536.168	1	2536.168	20.895	.000	.295
Interestpre-test	391.410	1	391.410	3.225	.079	.061
Students Interest	176.918	1	176.918	1.458	.233	.028
Error	6068.979	50	121.380			
Total	140793.000	53				
Corrected Total	6587.547	52				
a. R Squared = .079 (Adjusted R Squared = .042)						

The result presented in Table 4 shows that the probability value is 0.23 which is greater than 0.05. This implies that there is no statistically significant difference ($p=0.23>0.05$, $F=1.46$) in the interest of Home Economics Education students taught pattern drafting using CAD and Flat instructional techniques. The null hypothesis is therefore not rejected but accepted. Furthermore, the partial eta squared of 0.028 implies that the treatment (CAD) accounts for 2.8% of the observed variance in the interest of students who received instruction in pattern drafting.

Research Question 3: What are the effects of two techniques of pattern drafting (Flat and CAD) on the retention of Home Economics Education students?

Table 5: Mean and Standard Deviation Analysis of the Two Instructional Techniques in Pattern Drafting on the Retention of Home Economics Education Students

Teaching Techniques	Post-test		Post-Post-test		Gain	Difference
		SD		SD		
CAD	35.00	3.07	36.68	1.63	1.68	**0.75**
FLAT	30.64	2.83	31.57	2.87	0.93	
Gain	**4.36**	**0.24**	**5.11**	**-1.24**		

Result in Table 5 shows that the Home Economics Education students received instruction through CAD instructional techniques had a post-test score of 35.00 ±3.07 and a post-post-test score of 36.68±1.63 with a mean gain of 1.68 while the students that received the same instruction through Flat pattern drafting techniques had a post-test score of 30.64 ±2.83 and a post-post-test score of 31.57 ±2.87 with a mean difference of 0.93. This implies that Home Economics Education students taught using CAD instructional techniques retain more knowledge (1.68) than those taught using Flat techniques (0.93). Similarly, knowledge retention of Home Economics Education students taught pattern drafting increased by 0.75 in favour of CAD instructional techniques. The result also indicated that the post-test score of students of Home Economics Education taught with CAD and Flat techniques is 4.36 ±0.24 and a post-post-test (retention test) of 5.11±-1.24 which implies that the students retained knowledge after receiving instruction through the instructional methods.

Hypothesis 3: There is no significant difference between the mean knowledge retention of Home Economics Education students taught pattern drafting through Flat and CAD instructional techniques.

Table 6: ANCOVA Analysis of the Effect of Flat and CAD Techniques of Instruction on the Knowledge Retention of Home Economic Education Students in Pattern Drafting

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	396.709[a]	2	198.354	42.334	.000	.629
Intercept	213.171	1	213.171	45.496	.000	.476
Post-test	52.025	1	52.025	11.103	.002	.182
Retention	110.131	1	110.131	23.505	.000	.320
Error	234.272	50	4.685			
Total	61831.000	53				
Corrected Total	630.981	52				
a. R Squared = .629 (Adjusted R Squared = .614)						

Result in Table 6 shows that there is a statistically significant difference (p=0.00<0.05, F=23.51) in the mean knowledge retention of Home Economics Education students who received instruction in pattern drafting through CAD and Flat techniques. This implies that the hypothesis which stated that there is no significant difference in the mean knowledge retention of Home Economics Education students in pattern drafting is rejected. Furthermore, the partial eta squared of 0.32 implies that 32% of the observed variance in knowledge retention can be attributed to the CAD instructional techniques.

Discussion:

Effects of Flat and CAD techniques of pattern drafting on the academic achievement of Home Economics Education students.

The findings of the study revealed that the use of CAD instructional technique is more effective than the flat method in teaching pattern drafting to students of home economics education in the universities in the south-east, Nigeria. This is in line with the findings of Abusomwan, and Osaigbovo (2020) who stated that Computer Aided

Design is relevant and vital in teaching and learning process because it easily helps students to gain better knowledge and skills by watching procedures and demonstration on the screen of the computer. It is a practical and productivity tool that aids the students' for better practical work in pattern drafting. Asiloku (2016) also stated that CAD provides students with deeper understanding of the intricate stages of pattern drafting than the traditional flat technique. CAD technology helps to provides power tools that improves students' academic achievement in pattern drafting. It support the shift to student-centered learning and helps to create more interactive and engaging learning environment for lecturers and students (UNESCO, 2012).

The Effects of Flat and CAD techniques of pattern drafting on the interest of Home Economics Education students:

The findings of the study revealed that the interest of students in pattern drafting through CAD instructional technique appreciated while the interest of students in pattern drafting through Flat technique depreciated. This impliesthat the interest of students increased after receiving instruction in pattern drafting through CAD than the flat technique. These findings are in agreement with the opinion of Traylor, (2013) who stated thatpattern drafting aspect of Home Economics education need to be assisted by using computer aided tools to help in improving students' interest and visualization.This finding is in accordance with the findings of Bennett, (2012) who found that the use of CAD software in teaching and learning process in a planned and appropriate manner improves thestudent's interest and aids the efficiency and effectiveness of teaching and learning. This implies that there is effectiveness in the performance of students on pattern drafting because the use of CAD will improve the interest of the students on the subject which will eventually lead to improved academic achievement.

The Effects of Flat and CAD techniques of pattern drafting on the knowledge retention of Home Economics Education students

The findings of the study revealedthat Home Economics Education students taught using CAD instructional technique retain more knowledge of pattern drafting than those taught using Flat technique. Furthermore, the students retained knowledge in the course after receiving instruction through the two instructional techniques. The findings are in agreement with Alkan (2016) who stated thatappropriate practical work enhances learners' experiences, understanding, skills and enables them to retain most information/knowledge about the course.Practical work puts the students at the center of learning where they can

participate in, rather than be told about pattern drafting concepts.Research by Babalola, Lambourne, and Swithenby, (2020) has proven that if students are to understand the theoretical aspect of pattern drafting taught in the classroom so as to translate them to real life situations, they must master the techniques of practical aspects.Students tend to learn better and retain knowledge and information in activity-based courses like pattern drafting where they can manipulate equipment and apparatus to gain insight in the content, especially when technology is involved in the teaching/ learning process.

Conclusion:

Based on the findings, it was observed that students taught with CAD technique have better academic achievement with higher interest and retention of knowledge in pattern drafting when compared with those taught with flat technique. There was a significant difference in the mean academic achievement, interest and retention of students taught pattern drafting using CAD technique than those taught with the flat technique.

Recommendations :

Based on the findings of this study, the following recommendations were made:

1. The curriculum planners should integrate CAD into the curriculum of universities to improve the teaching and learning of pattern drafting in Home Economics Education.
2. Teacher training institutions like colleges of Education and universities should emphasize the application of Computer Aided Design Techniques as part of their Home Economics Education training.
3. The government should provide adequate ICT infrastructure and equipment, including computer hardware and software in all schools to aid the application of CAD in teaching and learning of pattern drafting.

Data Availability Statement: All relevant data are within the paper and its information files.

Competing Interest: The authors have declared that no competing interest exist

Author Contributions
Conceptualization: Ugwu Eunice Ifenyinwa, Attah Blessing Ijeoma, Gera Nguvan Patience.
Data curation: Ugwu Eunice Ifenyinwa , Eze Ngozi Mary

Formal analysis: Ugwu Eunice Ifenyinwa, Attah Blessing Ijeoma , Ezeaku Margret Ndidiamaka

Investigation: Ifeanyichukwu Obioma Irene, Emmanuel Chekwube Eze,

Methodology: Eze Ngozi Mary

Resources: Ifeanyichukwu Obioma Irene, Emmanuel Chekwube Eze, Emeghebo Udochukwu M.

Supervision: Nwafor Eucharia Chinwendu , Eze Ngozi Mary

Validation: Emeghebo Udochukwu M, Nwafor Eucharia Chinwendu , Eze Ngozi Mary[1]

Visualization: Eze Ngozi Mary

Writing – original draft: Ugwu Eunice Ifenyinwa

Writing- review & editing: Ugwu Eunice Ifenyinwa, Attah Blessing ,Eze Ngozi Mary

References:

1. *Abusomwan, S. B.&Osaigbovo, L. (2020). Effect of Computer Aided Instruction on Students' Academic Achievement in Technical Drawing in Secondary Schools in Edo State. KIU Journal of Social Sciences, 6(2), 367–374.*

2. *Ajunwa, E. (2015). Development of patterns for mass production of suits for adolescents in Benue State, Nigeria. Unpublished Ph.D. Thesis. Ahmadu Bello University, Zaria.*

3. *Alkan, F. (2016). Experiential Learning: Its Effects on Achievement and Scientific Process Skills. Journal of Turkish Science Education, 13(2), 45-90.*

4. *Anyakoha, E. U. &Eluwa J. T. (2015). Home management for schools and colleges. Nsukka: University Trust Publishers.*

5. *Arubayi D. O. &Obunadike J. C. (2011). Problems of teaching and learning clothing and textiles in senior secondary schools in Anambra State, Nigeria. Kamla Raj. Stud Home Com Sci,5(2), 113 – 119.*

6. *Asilokun, B. (2016). Effects of Computer Auto CAD Software Assisted Instruction on the performance of Secondary School Students in Technical Drawing. Technology Education Journal,6(1), 175-183.*

7. *Babalola, F., Lambourne, R. & Swithenby, S. (2020). The Real Aims that Shape the Teaching of Practical Physics in Sub-Saharan Africa. International Journal of Science and Maths Education, 18(4), 259–278.*

8. *Bala, F.T., Oghenejabor, U.O., Unogu, C.N., Abdullahi, H.I. & Akande, M.M. (2015). Home Economics for Junior Secondary School. Evans Brothers Limited: Ibadan.*

9. *Bennett, S. M. (2012). The effects of computer assisted instruction on rural algebra I students.Retrieved April 1, 2014, from www.nmu.edu.*

10. Bronsard, S. C. (2002). *The relationship between classroom motivation and academic achievement in first and third graders. Master's Thesis, B.C.J. Louisiana State University.*

11. Igbo, C. A. &Iloeje, C. I. (2012). *The basic of dress pattern drafting. Enugu: Inselberg (Nig) Ltd.*

12. Imayanti, H.S. & Yahya, M. (2018). *The Effectiveness of Clothing Pattern Making Training with CAD-based system on Fashion students. Advances in Social Sciences Education and Humanities Research (ASSEHR), (201), 311-316.*

13. Isukpa, M. E. (2014). *Effect of role play method on students' academic achievement and interest in Christian religious studies in senior secondary schools In Ebonyi Central Education Zone of Ebonyi State, Nigeria. Unpublished M.Ed Thesis, University of Nigeria.*

14. Komolafe, F. (2016). *Reinforcing psychomotor skill of clothing and textile teachers in Nigerian Secondary School. Multidisciplinary Journal of Research Development, 25(1), 115 - 126.*

15. Okoh, P. A. &Nkwodimmah, E. C. (2014). *Clothing and textile education in secondary schools for job creation and sustainable national development. journal of teacher perspective, 5(3), 445 – 462.*

16. Onyeazor, U. C. (2019). *Development of software package for teaching pattern drafting skills in tertiary institutions in South East Nigeria. Unpublished Ph.D. Thesis, University of Nigeria Nsukka.*

17. Tabraz, M. D. (2017). *Importance of fashion CAD (computer aided design) study for garment industry in Bangladesh. International Journal of Scientific & Technology Research, 6(10), 220 - 234.*

18. Traylor, P. (2013). *Effects of Computer Assisted Instructional on different learners. Journal of Educational Research,79(1), 12-38.*

19. UNESCO, (2012).*Information and Communication technology in teacher education. Retrieved from www.unesdoc.org.images.*

20. Wang, C. C. L. (2013). *CAD Tools in fashion/garment design. Computer-Aided Design and Applications, 1(1-4), 53 – 62.*