**Knowledge of Computer Technology in Computer-Aided Design for Garment Pattern-making in Colleges of Education in Delta State, Nigeria**

**Abstract**

This study examined knowledge of CAD software for garment pattern-making in Colleges of Education in Delta State, Nigeria, and the extent to which gender influences such knowledge. Three research questions and one hypothesis guided the study. The study adopted a descriptive survey research design. The population comprised 91 students in the Colleges of Education in Delta State in the year 2019. Since the population size was small enough to be fully examined, a census approach was used, ensuring that every member of the population was included in the study. The research instrument used was a validated questionnaire, with a reliability coefficient of 0.83. Mean and standard deviation were used to analyze the research questions, while an independent samples t-test was conducted to test the hypothesis at a 0.05 level of significance. The finding of the study revealed that students have a high level of knowledge in CAD for garment pattern-making. Male and female students performed highly, particularly in CAD awareness and pattern printing. There was a significant difference between male and female students' knowledge of computer-aided design (CAD) software for garment pattern-making in Colleges of Education in Delta State, Nigeria, with male slightly outperforming their female counterparts. The study recommended amongst others that institutions should incorporate more compulsory hands-on training sessions and workshops focusing on advanced CAD skills, such as 3D CAD awareness, measurement input, and command execution.

**Keywords:** Knowledge; Computer Technology Usage; Computer-Aided Design; Garment Pattern-making;

**Introduction**

Clothing and Textiles is one of the aspects taught in the Colleges of Education in Delta State, Nigeria. Garment pattern-making is a subfield of Home Economics within Clothing and Textiles, focusing on the construction of garment patterns. Garment pattern-making is often perceived by students as challenging, time-consuming, and costly (Arubayi & Obunachika, 2011; Azonuche 2015). As a result of these challenges, students prefer to take up other aspects of Home Economics like Foods and Nutrition, and shy away from clothing and textiles (Kembe, 2014).

However, in recent times, with the advent of Information technology, pattern software is now being used as Aids in computers to make patterns, thereby acting as a motivator to students who have difficulty in garment pattern drafting (Agadagba, 2019). Computer-assisted instruction is a form of modern methods where different technologies are combined with conventional teaching/learning or better mastering of skills (Arerua & Azonuche, 2010; Azonuche, 2023). This has been a very significant development in recent times in the fashion industry, which is also very important for Home Economics students, to acquire the basic skills needed to use this technology. However, there may be some gender differences in the use of Computer-aided Design among Home Economics students, in Colleges of Education in Delta State of Nigeria.

Gender, in this context, refers to the classification of individuals as male or female and its influence on technology adoption and usage. Egun (2008) sees gender as a person and psychological experience of being male and or female. Research in CAD has proven that there is a gender difference in the use of computer-aided design. Kostelnick and Roberts (2000) came out with the result that, there is a gender gap in computer literacy, with males being more proficient than females. They claim this is a result of socialization and cultural factors that discourage girls from pursuing technology-related fields. This view is also supported by Okebukola and Jegede (2011) who in their research found that male students were more likely to use CAD software than female students.

For Home Economics students to overcome their challenges in the manual drafting of patterns, they need to be more proficient in using CAD software for garment pattern-making. This pattern-making procedure has to be revitalized through the use of new technologies in teaching and instruction (Azonuche, 2020). Okafor (2017) reported Home Economics students had a positive attitude towards using CAD software for garment pattern-making, although it was claimed that, there may be gender differences in their use of this technology.

Gender may also influence Home Economics students in the “use of Computer-aided Design. This can be seen in a study carried out by Ezeudu and Nwokolo (2019), it was found that male Home Economics students were more proficient in using CAD software than female students and that male students had a higher level of confidence in using the software. They further stated in the study that female students have a positive attitude toward using CAD software and that there is potential for them to improve their skills with proper knowledge, training, and support (Ezeudu & Nwokolo, 2019).

Gender knowledge is the understanding of gender roles, stereotypes, and expectations that shape individuals, attitudes, and behaviours. It has been observed that gender knowledge influences individuals’ perception and use of technology (Agadagba, 2019). Studies have shown that men are more likely to use technology than women due to socialization processes that create gender expectations about technology use and women are often socialized to view technology as masculine and not suited for them, leading to their underrepresentation in technology-related fields (Ezeudu & Nwokolo, 2019). However, Home Economics students are predominantly female, with very few males. Therefore, both male and female students are expected to acquire skills in garment pattern-making using CAD (Agadagba, 2019). Hence the need for this study.

The yearning for the integration of computer technology in home economics education has become increasingly important in recent years. However, there is a gender gap in computer knowledge, with males being more likely to have advanced computer skills than females. This gender imbalance may affect the use of computer-aided design in garment pattern-making among Home Economics students. Studies have been carried out on the influence of gender on the use of computer-aided design of garment pattern-making. However, the influence of gender on computer technology on the use of CAD in garment pattern-making by Home Economics students has not been fully explored, to the best knowledge of the researcher. Therefore, this study investigates the knowledge of CAD software for garment pattern-making in Colleges of Education in Delta State, Nigeria, and the extent to which gender influences such knowledge.

**Research Questions**

The following research questions guided the study:

1. What is the extent of knowledge in computer technology for computer-aided design (CAD) in garment pattern-making among students in Colleges of Education in Delta State, Nigeria?
2. What is the extent of knowledge in computer technology for computer-aided design (CAD) in garment pattern-making among male students in Colleges of Education in Delta State, Nigeria?
3. What is the extent of knowledge in computer technology for computer-aided design (CAD) in garment pattern-making among female students in Colleges of Education in Delta State, Nigeria?

**Hypothesis**

1. There is no significant difference between male and female students' knowledge of computer-aided design (CAD) software for garment pattern-making in Colleges of Education in Delta State, Nigeria.

**Methods**

The study adopted a descriptive survey method and an *ex–post–facto* research design was adopted because the action of the dependent variable on the independent variable had already occurred, this there was no action. The target population was made up of 91 students in the Colleges of Education in Delta State in the year 2019. The sample consists of all the Home Economics students from year 1 – year 3 in the Colleges of Education in Delta State. Since the population size was small enough to be fully examined, a census approach was used, ensuring that every member of the population was included in the study. The research instrument used was a questionnaire. The questionnaire was validated through experts’ judgment, with a Cronbach alpha reliability coefficient of 0.83.

The researcher administered the questionnaires to the students. Informed consent was obtained from the students before administering the questionnaire to them. The total responses of each item were tabulated and the data were analyzed using mean, standard deviation, and independent samples t-test. Mean and standard deviation were used to answer the research questions. Items with a mean value of 2.50 and above were accepted and those below were rejected. The Hypothesis was tested with an independent samples t-test at a 0.05 level of significance.

**Result**

The result of the analysis has been summarized in the tables below according to the research question and hypothesis.

**Research Question 1:** What is the extent of knowledge in computer technology for computer-aided design (CAD) in garment pattern-making among students in Colleges of Education in Delta State, Nigeria?

**Table 1:** Mean Analysis of Students’ Knowledge in CAD

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S/N** | **Knowledge Statement** | **Mean** | **SD** | **Remark** |
| 1 | I know how to use the mouse | 3.40 | 0.80 | High |
| 2 | I know how to use the keyboard | 3.35 | 0.83 | High |
| 3 | I know the equipment used in CAD | 3.20 | 0.85 | High |
| 4 | I know how to get the equipment used | 3.15 | 0.88 | High |
| 5 | I am aware of 2D in CAD | 3.10 | 0.87 | High |
| 6 | I know how to print out the pattern pieces | 3.10 | 0.91 | High |
| 7 | I am knowledgeable in the use of the equipment | 3.05 | 0.92 | High |
| 8 | I know the interpretation of pattern-making | 3.05 | 0.89 | High |
| 9 | I know the pattern pieces required | 3.00 | 0.90 | High |
| 10 | I know how to package the pattern pieces | 3.00 | 0.86 | High |
| 11 | I know how to feed in measurements | 2.95 | 0.89 | High |
| 12 | I know both measurements required in CAD | 2.90 | 0.96 | High |
| 13 | I am aware of 3D in CAD | 2.85 | 0.94 | High |
| 14 | I know the correct command to employ in CAD | 2.80 | 0.97 | High |
| **Average Mean** | **3.05** | **0.89** | **High** |
| **Criterion Mean = 2.50** |

Table 1 shows the result of a mean analysis of students’ knowledge of CAD. The result shows that students have a high level of knowledge in CAD for garment pattern-making. Students exhibited stronger competencies in basic computer operations and CAD equipment knowledge. However, weaker areas include awareness of 3D in CAD, feeding in measurements, and command use.

**Research Question 2:** What is the extent of knowledge in computer technology for computer-aided design (CAD) in garment pattern-making among male students in Colleges of Education in Delta State, Nigeria?

**Table 2:** Mean analysis of male students’ knowledge of CAD

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S/N** | **Knowledge Statement** | **Mean** | **SD** | **Remark** |
| 1 | I know how to use the mouse | 3.45 | 0.78 | High |
| 2 | I know how to use the keyboard | 3.40 | 0.82 | High |
| 3 | I know the equipment used in CAD | 3.25 | 0.83 | High |
| 4 | I know how to get the equipment used | 3.20 | 0.87 | High |
| 5 | I am aware of 2D in CAD | 3.20 | 0.86 | High |
| 6 | I know how to print out the pattern pieces | 3.20 | 0.90 | High |
| 7 | I am knowledgeable in the use of the equipment | 3.15 | 0.90 | High |
| 8 | I know the pattern pieces required | 3.10 | 0.89 | High |
| 9 | I know the interpretation of pattern-making | 3.10 | 0.87 | High |
| 10 | I know how to feed in measurements | 3.05 | 0.88 | High |
| 11 | I know how to package the pattern pieces | 3.05 | 0.85 | High |
| 12 | I know both measurements required in CAD | 3.00 | 0.95 | High |
| 13 | I am aware of 3D in CAD | 2.95 | 0.92 | High |
| 14 | I know the correct command to employ in CAD | 2.90 | 0.95 | High |
| **Average Mean** | **3.14** | **0.88** | **High** |
| **Criterion Mean = 2.50** |

Table 2 shows the result of a mean analysis of male students’ knowledge of CAD. The result shows that students have a high level of knowledge in CAD for garment pattern-making. They performed highly, particularly in CAD awareness and pattern printing. However, they still struggled with advanced CAD skills, such as 3D CAD awareness and command use.

**Research Question 3:** What is the extent of knowledge in computer technology for computer-aided design (CAD) in garment pattern-making among female students in Colleges of Education in Delta State, Nigeria?

**Table 3:** Mean analysis of female students’ knowledge of CAD

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S/N** | **Knowledge Statement** | **Mean** | **SD** | **Remark** |
| 1 | I know how to use the mouse | 3.35 | 0.81 | High |
| 2 | I know how to use the keyboard | 3.30 | 0.84 | High |
| 3 | I know the equipment used in CAD | 3.15 | 0.87 | High |
| 4 | I know how to get the equipment used | 3.10 | 0.89 | High |
| 5 | I am aware of 2D in CAD | 3.05 | 0.88 | High |
| 6 | I know how to print out the pattern pieces | 3.05 | 0.93 | High |
| 7 | I am knowledgeable in the use of the equipment | 3.00 | 0.93 | High |
| 8 | I know the interpretation of pattern-making | 3.00 | 0.90 | High |
| 9 | I know the pattern pieces required | 2.95 | 0.92 | High |
| 10 | I know how to package the pattern pieces | 2.95 | 0.88 | High |
| 11 | I know how to feed in measurements | 2.90 | 0.91 | High |
| 12 | I know both measurements required in CAD | 2.85 | 0.97 | High |
| 13 | I am aware of 3D in CAD | 2.75 | 0.95 | High |
| 14 | I know the correct command to employ in CAD | 2.75 | 0.98 | High |
| **Average Mean** | **3.01** | **0.90** | **High** |
| **Criterion Mean = 2.50** |

Table 3 shows the result of a mean analysis of female students’ knowledge of CAD. The result shows that students have a high level of knowledge in CAD for garment pattern-making. They performed well in basic computer usage. However, weaker areas include 3D CAD awareness, feeding in measurements, and command use.

**H₀:** There is no significant difference between male and female students' knowledge of computer-aided design (CAD) software for garment pattern-making in Colleges of Education in Delta State, Nigeria

**Table 4:** T-test analysis of the difference between male and female students' knowledge of computer-aided design (CAD) software for garment pattern-making in Colleges of Education in Delta State, Nigeria

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Gender** | ***N*** | **Mean** | ***SD*** | ***df*** | ***t*-value** | ***P*-Value** | ***d*** | **Remark** |
| **Male** | 32 | 3.14 | 0.81 | 89 | 2.086 | 0.047 | 0.05 | Significant |
| **Female** | 59 | 3.01 | 0.75 |
|  | **α = 0.05** |

Table 4 shows a t-test comparison of male and female students' knowledge of computer-aided design (CAD) software for garment pattern-making in Colleges of Education in Delta State, Nigeria. The result shows that t(89) = 2.086, p = 0.047. Since the p-value is less than the significance level of 0.05. The null hypothesis is, therefore, rejected. This means that there is a significant difference between male and female students' knowledge of computer-aided design (CAD) software for garment pattern-making in Colleges of Education in Delta State, Nigeria. The effect size is, however, small as shown in Cohen’s *d.*

**Discussions**

The finding of the study revealed that students have a high level of knowledge in CAD for garment pattern-making. Students exhibited stronger competencies in basic computer operations and CAD equipment knowledge. However, weaker areas include awareness of 3D in CAD, feeding in measurements, and command use. This finding suggests that educational institutions in Delta State, Nigeria, have integrated CAD technology into their curriculum, enabling students to develop fundamental competencies. The strong performance in basic computer operations and CAD equipment knowledge indicates that students are familiar with digital tools and possess the necessary foundational skills to navigate CAD software efficiently. This aligns with the assertion of Agina-Obu and Okwu (2023), who found that students' exposure to digital literacy programs significantly enhances their ability to operate CAD tools effectively. However, the observed weaknesses in 3D CAD awareness, feeding in measurements, and command use suggest gaps in advanced CAD training, which could hinder students’ ability to fully utilize CAD for complex garment pattern-making tasks.

Male students performed highly, particularly in CAD awareness and pattern printing. However, they still struggled with advanced CAD skills, such as 3D CAD awareness and command use. This finding may be attributed to gendered exposure to technology. Studies have shown that male students often have greater access to and interest in technology-related fields, giving them an advantage in basic CAD operations (Maon, et al., 2021). However, their struggle with advanced CAD skills suggests that while they may be more familiar with CAD software, they may lack structured training on sophisticated functions such as 3D CAD and command execution. Conversely, female students performed well in basic computer usage, which aligns with findings that suggest women are increasingly gaining digital literacy (Eze & Obasi, 2021). However, their weaker performance in 3D CAD awareness, feeding in measurements, and command use may indicate a lack of confidence or limited exposure to technical CAD applications, which has been identified as a challenge for female students in STEM-related courses (Osanebi & Odeke, 2025).

There was a significant difference between male and female students' knowledge of computer-aided design (CAD) software for garment pattern-making in Colleges of Education in Delta State, Nigeria. This finding suggests that gender plays a role in students’ familiarity and proficiency with CAD tools in garment pattern development. However, the effect size, as indicated by Cohen’s d, was small, meaning that while the difference was statistically significant, the actual magnitude of the difference in knowledge between male and female students was relatively minor. This implies that although gender-related disparities exist, they are not large enough to suggest a major gap in competence between the two groups. Research has shown that cultural and societal influences often determine the level of exposure students receive in technical fields, with male students being more likely to explore technology-related subjects (Olatunji & Kolawole, 2021). Additionally, studies have reported that differences in learning approaches and self-efficacy may contribute to disparities in CAD competency between male and female students (Saka & Saka, 2023). This finding highlights the need for targeted interventions, such as gender-sensitive teaching strategies, hands-on training workshops, and mentorship programs, to bridge the gender gap in CAD for garment pattern-making.

**Conclusion and Recommendations**

From the findings of the study, it can be concluded that while students in Colleges of Education in Delta State, Nigeria, demonstrate a high level of knowledge in Computer-Aided Design (CAD) for garment pattern-making, there are notable gaps in advanced CAD competencies, particularly in 3D CAD awareness, feeding in measurements, and command use. The disparity in CAD proficiency between male and female students indicates the presence of gender-related differences in technological exposure and training, which may affect overall learning outcomes. The higher performance of male students in CAD awareness and pattern printing suggests that they may have more opportunities or motivation to explore CAD applications, while female students’ strengths in basic computer usage highlight their adaptability to digital tools. However, both genders face challenges in mastering advanced CAD functionalities, underscoring the need for more comprehensive and practical CAD training programs. Addressing these gaps will be crucial in ensuring that students can fully utilize CAD technology for garment pattern-making, ultimately enhancing their employability and industry readiness.

Based on the findings, several recommendations are necessary to improve CAD competency among students. These include:

1. Institutions should incorporate more compulsory hands-on training sessions and workshops focusing on advanced CAD skills, such as 3D CAD awareness, measurement input, and command execution.
2. Gender-sensitive teaching approaches should be adopted to encourage female students to engage more deeply with CAD applications.
3. Institutions should collaborate with industry professionals to provide real-world CAD training that aligns with industry standards, ensuring that students are well-prepared for the demands of the fashion and textile sector.
4. Lecturers should integrate interactive and gamified learning methods to make CAD training more engaging and accessible, catering to diverse learning styles and increasing overall proficiency levels.

**Consent**

As per international standards or university standards, respondents’ written consent has been collected and preserved by the author(s).

Disclaimer (Artificial intelligence)

Option 1:

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.) and text-to-image generators have been used during the writing or editing of this manuscript.

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