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Original Research Paper

Computer–Aided Instruction Approach of Undergraduate Students to Pattern Making for Fashion Enterprise in Nigeria

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ABSTRACT:
The incorporation and application of Computer-Aided Instruction (CAI) technology within Clothing and Textile education represent a pioneering and essential stride toward preparing the future workforce required for the apparel industry. This investigation focused on assessing the CAI approach employed by undergraduate students in pattern making for the fashion enterprise in Nigeria. The aim was to identify the challenges faced by students using CAI and propose strategies to address these challenges. The study involved testing a hypothesis and utilized a descriptive survey research design. The population comprised 363 respondents, with 154 students from clothing and textiles purposively selected from two federal and two state universities in South-south Nigeria. Data was collected through questionnaires and analyzed using percentages, mean, standard deviation, and t-test. The results revealed that students' CAI approach to pattern making encompassed learning accurate body measurements, utilizing CAI in pattern making, engaging in theory and practical classes, employing pattern software, enhancing learning effectiveness and interest, and promoting student-centered rather than teacher-centered learning. Challenges encountered included insufficient computers and reliance on mini computers, connectivity issues, financial constraints on data acquisition, high costs of pattern software, and inadequate funding for procuring and maintaining CAI/CAD tools. In conclusion, the CAI approach to pattern making, as an innovative learning process, imparts knowledge and practical skills to students, enabling them to competently function in the realm of fashion enterprise. Recommendations include the provision of adequate resources by university management and government to facilitate effective individualized learning participation.

Keywords: Computer-Aided Instruction, Pattern making, Undergraduates, Students.

INTRODUCTION:

Recent advancements and innovations in the clothing and textile industry have brought significant changes to the fashion and clothing market. The 21st century's Information Communication Technology (ICT) breakthrough has led to a substantial development in apparel, notably through Computer-Aided Instruction (CAI), Computer-Aided Design (CAD), and Computer-Aided Manufacture (CAM). In the dynamic global environment, ICT serves as a driving force for development and survival, as acknowledged by the Federal Republic of Nigeria (FRN) in its National Policy for Information Technology (2001). This policy defines ICT as interconnected equipment used for acquiring, storing, manipulating, displaying, and transmitting information, encompassing computers, satellites, fiber optic cables, telephones, facsimile machines, hardware, software, and more.

The quest for high-quality teaching and learning experiences has intensified due to global exposure and knowledge in educational technology development. CAI, involving the use of computers for teaching and learning practices, drills, simulations, and tutorials, has become integral in education, enhancing both in-home and in-school learning processes. Students now use computers not only as instructional tools but also as mediums for self-directed learning, providing opportunities to control and engage with the real world.

The application of CAI in clothing and textiles education enhances students' learning abilities, facilitates information sourcing, and develops skills and competencies in Computer-Aided Design (CAD) to meet the demands of the apparel industry. It is particularly beneficial in skill areas such as pattern making, where it empowers learners to access information and acquire skills. The adoption of CAI in clothing and textiles

education opens gateways to skill competencies, manpower development, and utilization.

In the field of fashion enterprise, where the production and marketing of fashionable clothing play a crucial role, the success of designers depends on their knowledge and skills in clothing production. Fashion designers need to stay updated with trends, generate appealing designs, and use computer-aided design for style development. The importance of training programs in institutions is emphasized, as knowledge and skills in clothing production are essential for students in their pursuit of careers in the fashion industry.

Traditionally, pattern making in clothing development has been seen as cumbersome and time-consuming. However, the incorporation of Computer-Aided Instruction (CAI) in teaching pattern making brings innovation to this process. This modern approach prepares and advances professionals in clothing and textiles who can compete globally in the garment industry. CAI engages learners in self-directed learning in garment-making technology, utilizing tools such as the worldwide web, CD-ROM, compact disks, and more.

As the computer age progresses, CAI becomes crucial for increasing learners' capabilities in both theoretical and practical garment development activities. Fashion CAD software plays a key role in computerized pattern making in the apparel manufacturing industry, integrating pattern design, grading, detailing, layout, and CAD drafting systems. The use of Computer-Aided Design/Instruction in pattern preparation, grading, alteration, adaptation, and marking patterns is highlighted, utilizing software, hardware, and communication gadgets.

Three-dimensional (3D) body scanners are employed to obtain accurate graphic body shapes, which are processed for pattern development. The developed patterns are then sent to automated cutting machines. In the realm of fashion enterprise, the success of pattern making depends on training programs that equip students with the knowledge and skills needed for modern styles in the fashion industry.

The evolution of ICT has brought significant changes to teaching and learning in tertiary institutions. Ineffective teaching methods and instructional delivery have been linked to poor student attitudes, skills, knowledge, and performance in clothing and textiles. The conventional lecture and demonstration approach is considered outdated and ineffective in stimulating students' creativity and initiative. The study examines the CAI approach of undergraduate students to pattern making for the fashion enterprise in Nigeria, aiming to equip students with competencies for sustainable industrial development and entrepreneurship.

Purpose of the Study:

The main purpose of the study was to examine computer aided instruction (CAI) approach of undergraduate students to pattern making for fashion enterprise in Nigeria. Specifically, the study;

(i) Examined the undergraduate students' computer aided instruction (CAI) approach to pattern making for fashion enterprise.

(ii) ascertained the challenges encountered by the undergraduate students in CAI approach to pattern making for fashion enterprise.

(iii) Determined measures to combat challenges encountered in computer aided instruction (CAI) approach of undergraduate students to pattern making for fashion enterprise

Research Questions:

The study was guided by the following research questions;

(i) What is the undergraduate students' computer aided instruction (CAI) approach to pattern making for fashion enterprise?

(ii) What are the challenges encountered by the undergraduate students in CAI approach to pattern making for fashion enterprise?

(iii) What are the measures to combat challenges encountered in computer aided instruction (CAI) approach of undergraduate students to pattern making for fashion enterprise?

Hypothesis

(i) There is no significant difference in the Computer aided instruction approach of undergraduate students to pattern making for fashion enterprise between federal and state universities in Nigeria

Research Methods:

The research employed a descriptive survey method, focusing on the south-south region of Nigeria, which includes the states of Delta, Edo, Bayelsa, Rivers, Akwa-Ibom, and Cross River. The study's target population comprised 363 subjects, encompassing all students in clothing and textile education across universities in the south-south region.

For the purpose of the study, a purposive sampling technique was utilized to select 154 final-year (400 level) students from two federal universities (University of Benin, Benin City = 36 and University of Uyo, Uyo = 45) and two state universities (Delta State University, Abraka = 15 and Ignatius Ajuru University, Port Harcourt = 58). These final-year students were chosen as they engage in computer-aided instruction in pattern making, which is expected to enhance their competency for the fashion enterprise post-graduation.

Data collection was carried out using a structured questionnaire designed to address specific study objectives. The questionnaire employed a four-point rating scale: Strongly Agree (SA), Agree (A), Disagree (D), and Strongly Disagree (SD), with corresponding ratings of 4, 3, 2, and 1, respectively. To ensure the validity of the questionnaire, three lecturers in clothing and textiles from the University of Nigeria, Nsukka, Enugu State, face-validated the items. The questionnaire was pre-tested on 20 subjects not included in the study, resulting in a reliable Cronbach alpha coefficient of 0.76.

The instrument was then administered to the 154 clothing and textile students by the researcher and research assistants. All administered questionnaires were duly filled and returned for analysis.

Research questions were addressed using mean and standard deviation, with a cutoff point of 2.50. Items with a mean ranging from 2.50 to 4.00 were considered strongly agreed, while those with a mean of 1.00 to 2.49 were regarded as strongly disagreed. Additionally, a t-test was employed for hypothesis testing at a significance level of 0.05.

RESULTS:

Research Question One: What is the undergraduate students' computer- aided instruction (CAI) approach to pattern making for fashion enterprise?

Table 1: Mean score of responses of undergraduate students' Computer Aided Instruction approach to pattern making for fashion enterprise.

S/No	Undergraduate students' approach CAI to pattern making	$\bar{x}$	SD	Decision
1	Learn how to take accurate body measurements for CAD	3.01	0.84	SA
2	Knowledgeable in the use of CAI for pattern making	2.70	1.00	SA
3	Use CAI to learn pattern making in the class.	2.90	1.12	SA
4	CAI is used to learn theoretical procedures in pattern making	2.57	0.81	SA
5	CAI is used in learning practical in pattern making	2.69	0.72	SA
6	CAI makes pattern making more interesting and effective	3.28	0.80	SA
7	CAI increases students participation in pattern making	3.52	0.81	SA
8	CAI makes pattern making procedure student centered than teacher centered	3.48	0.80	SA
9	Provide CAI equipment and tools for pattern making	3.06	0.76	SA
10	CAI is used for large group of students online	3.08	0.72	SA
11	Learn 3D scanner for body measurement	3.60	0.67	SA
12	Input measurement into computer for pattern drafting	3.20	0.75	SA
13	Use pattern soft ware to carry out CAD pattern making following instructions	3.00	0.64	SA
14	Operate the computer to plot pattern pieces	2.86	0.64	SA
15	Print out drafted patterns with symbols	2.90	0.80	SA
16	Use CAI for pattern grading in CAD	2.74	0.76	SA
17	Use CAI for alteration and adaptation for sizes and styles	3.92	0.69	SA

18	Download useful learning materials	3.42	0.74	SA
19	Select right fabrics for the styles	3.20	0.68	SA
20	Learn correct pattern laying and sewing methods	3.64	0.76	SA
21	Learn good fit in finishes garment	3.90	0.80	SA
22	Engage in online networking for fashion business	2.54	0.74	SA
23	Use mini computers for CAI approach to pattern making	3.00	0.70	SA

Key:$\bar{x}$ Mean, SD = Standard Deviation, SA-Strongly Agreed

Table 1 presents the results, indicating that respondents strongly agreed with all items, with mean values ranging from 2.70 to 3.92. This suggests a consensus among participants that the Computer-Aided Instruction (CAI) approach employed by undergraduate students encompasses various aspects, including learning to take accurate body measurements, being proficient in using CAI for pattern making, utilizing CAI in both theoretical and practical learning, and employing pattern software in drafting, among other activities. The results indicate that students' CAI approach involves a comprehensive learning process that includes accurate body measurements, proficient use of CAI in pattern making, engagement in both theory and practical learning, and the utilization of pattern software. Additionally, CAI is perceived as making the learning experience more interesting and effective, increasing student participation, and shifting the learning environment to be more student-centered rather than teacher-centered. The standard deviation, ranging from 0.64 to 1.12, indicates a close agreement among respondents in their responses.

Research Question Two:

What are the challenges encountered by the undergraduate students in CAI approach to pattern making for fashion enterprise?

Table 2: Mean score of responses on challenges of students in CAI approach to pattern making.

S/NO	Challenges of students in CAI approach to **pattern making**	$\bar{x}$	SD	Decision
1	Computers are not sufficient for use	3.22	0.72	SA
2	Some students use mini computer	3.48	0.76	SA
3	Poor network connectivity	3.00	0.71	SA
4	Inability to buy data for online learning	3.41	0.80	SA
5	High data consumption	3.60	0.62	SA
6	High cost of pattern software purchase	3.75	0.68	SA
7	Inadequate funding to procure CAI/CAD tools	3.00	0.71	SA
8	Inadequate technical support personnel	3.18	0.78	SA
9	Poor power supply for computer operation	3.00	0.67	SA
10	Inadequate computer tools and equipment maintenance	3.59	0.80	SA

Key: $\bar{x}$mean, SD Standard deviation, SA = Strongly Agreed.

Table 2 reveals that respondents strongly agreed with all items, as indicated by mean values ranging from 3.00 to 3.75. This implies a consensus among participants that challenges faced by students in Computer-Aided Instruction (CAI) include various issues such as the insufficiency of computers for use, some students relying on mini computers, poor network connectivity, inability to afford data bundles for online learning, and the high cost of pattern software, among other challenges. These findings highlight that students

encounter obstacles related to the availability and accessibility of computers, network issues, financial constraints, and software expenses. Specifically, challenges involve insufficient computers for use, reliance on mini computers, poor network connectivity, inability to afford data bundles for online learning, high costs associated with pattern software, and inadequate funding for the procurement and maintenance of CAI/CAD tools. The standard deviation, ranging from 0.62 to 0.80, indicates a close agreement among respondents in their responses to these challenges.

Research Question Three:

What are the measures to combat challenges encountered in computer aided instruction (CAI) approach of undergraduate students to pattern making for fashion enterprise?

Table 3: Mean scores of responses on measures to combat challenges of students in CAI approach to pattern making.

S/NO	Measures to combat challenges in CAI approach to pattern making	$\bar{x}$	SD	Decision
1	Enough computers should be made available	3.72	0.84	SA
2	Maintenance of available computers	3.82	0.69	SA
3	Laboratory technologist should be proficient in computer	3.20	0.62	SA
4	Pattern software should be made available by the school for use	3.40	0.70	SA
5	Improvement in power supply to enhance CAI approach in learning	3.64	0.70	SA
6	Student undertake field trips to fashion industries involved in the use of CAD	3.18	0.76	SA
7	Regular workshops should be organized for student to widen knowledge and keep abreast with the use of CAD in fashion	3.41	0.80	SA
8	Giving incentives to outstanding students in CAD	3.60	0.68	SA
9	Free internet connectivity should be provided in the school for use	3.85	0.79	SA

Key: :$\bar{x}$mean, SD Standard deviation, SA = Strongly agreed.

Table 3 illustrates that all items have mean values ranging from 3.00 to 3.85, surpassing the 2.50 mean cutoff. This suggests that respondents strongly agreed with the proposed measures to combat challenges faced by students in the Computer-Aided Instruction (CAI) approach. These measures include ensuring the availability of enough computers for use, maintaining existing computers, providing pattern software for use, ensuring that laboratory technologists are proficient in computer usage, improving power supply to enhance learning, organizing field trips to fashion industries that use Computer-Aided Design (CAD), and conducting regular workshops to enhance knowledge, among other measures.

The results indicate that respondents consider various actions as effective in addressing challenges related to CAI in pattern making. These actions encompass providing an adequate number of computers, ensuring the availability of pattern software, enhancing power supply, maintaining computers in use, ensuring computer proficiency among laboratory technologists, organizing field trips to relevant industries, and conducting regular workshops to enhance students' knowledge. The mean values above the cutoff point and a standard deviation ranging from 0.00 to 0.90 suggest a high level of agreement among respondents regarding the effectiveness of these measures.

Hypothesis:

There is no significant difference in the Computer aided instruction approach of undergraduate students to pattern making for fashion enterprise between federal and state universities in Nigeria

Table 4: t-test Analysis of the Mean ($\overline{X}$) Performance Ratings of Students in Federal and State Universities on CAI approach of undergraduate students to Pattern making

University	N	$\overline{X}$	SD	Df	T	P	Decision
Federal Universities	81	60.35	4.40	152	11.27	0.20	NS
State Universities	73	54.09	3.47				

Significant Level = (P > 0.05)

Key: N = Number of respondents; df = degree of freedom; t = t-value; p = table value; NS= not significant

The results presented in Table 4 indicate that the t-value, which is 2.61, is not significant at the equivalent significance level of P > 0.05. This leads to the acceptance of the null hypothesis. In simpler terms, the findings suggest that there is no statistically significant difference in the Computer-Aided Instruction (CAI) approach between undergraduate students in federal and state universities concerning pattern making for the fashion enterprise. In other words, the study did not find substantial evidence to support the idea that the CAI approach to pattern making differs significantly between students in federal universities (specifically the University of Benin and the University of Uyo) and state universities (specifically Delta State University, Abraka, and Ignatius Ajuru University, Port Harcourt). The lack of significance indicates that, in terms of CAI in pattern making, both sets of students from federal and state universities share a similar level of engagement or proficiency..

DISCUSSION:

The study's findings reveal that students' Computer-Aided Instruction (CAI) approach to pattern making involves various aspects such as learning to take accurate body measurements, being knowledgeable and using CAI in pattern making, engaging in both theoretical and practical classes, using pattern software, and making the learning process more interesting and effective. These findings align with previous research by Oshima & Muramatu (2015), Christensen (2016), Micheal (2011), and Diogo et al (2018), who have emphasized the positive impact of Information Communication Technology (ICT) on teaching and learning processes. The use of CAI is noted to shift the learning environment from conventional teacher-led instruction to a more student-centered approach, promoting self-sufficiency, independence, and individualized learning.

The study underscores the significance of pedagogical changes and innovations in the education system, making learning more meaningful. CAI is reported to enhance students' active involvement, cater to different learning styles, and create an environment that promotes effective utilization of technological facilities for skill development. In the context of fashion enterprise, which demands technology-oriented designers, CAI proves valuable for fostering creativity, motivation, and skill development.

However, the study also identifies challenges faced by students in the CAI approach, including insufficient computers, usage of mini computers, poor network connectivity, inability to buy data bundles for online learning, high costs of pattern software, inadequate funding for CAI/CAD tools, and inadequate maintenance of existing tools. These challenges are consistent with previous research by Bob-Eze (2021) and point to technical skills challenges, poor maintenance, and budget constraints affecting computer-assisted teaching and learning in pattern drafting.

To address these challenges, the study suggests measures such as providing enough computers, pattern software, improving power supply, maintaining computers, ensuring computer proficiency among lab technologists, organizing field trips, and conducting regular workshops. These findings align with existing literature emphasizing the importance of adequate training and learning equipment availability in influencing students' skills acquisition, especially in the context of clothing and textiles education.

The study concludes by highlighting the need for government support, funding, and provision of modern technological equipment in universities to enhance skills learning and economic empowerment. It emphasizes that CAI in pattern making is a valuable tool for overcoming students' phobia for pattern drafting, developing interest, and motivating them to acquire competencies for economic empowerment, development, sustainability, and poverty alleviation. The study finds no significant difference in the CAI approach to pattern making between federal and state universities, emphasizing the paramount importance of vocational skill development in achieving desirable results for fashion enterprise and societal development.

CONCLUSION:

The adoption of the Computer-Aided Instruction (CAI) approach as an innovation in pattern engineering within university education has significantly impacted students'

interests, motivation, and participation in the garment-making process. This approach equips students with valuable knowledge and skills in pattern production, enabling them to meet the demands of fashion enterprises and garment industries on a mass scale. To maximize the benefits of CAI, it is essential for clothing and textile lecturers and students to not only possess knowledge of CAI but also integrate its use seamlessly into both theory and practical classes. Using pattern software is particularly emphasized to enhance the learning experience, making it more interesting and effective while increasing students' active participation in individualized and collaborative learning.

Despite the evident advantages, students face challenges such as insufficient computers, the use of mini computers, irregular network connections, inability to purchase data for online learning, high costs associated with pattern software, and insufficient funding for the procurement and maintenance of CAI/CAD tools and equipment. Addressing these challenges requires strategic measures, including the provision of adequate computers, making pattern software accessible to students, improving electricity supply, maintaining computers effectively, ensuring the engagement of computer-proficient lab technologists, and organizing student excursions to fashion industries that utilize Computer-Aided Design (CAD). These measures aim to enhance students' involvement in fashion enterprises upon graduation, contributing to their competency, development, empowerment, and overall sustainability.

Recommendations:

These recommendations were made based on the findings

1. Students should be encouraged adopt the use of CAI approach to pattern making for instruction and learning delivery processes.
2. The instructional learning resources needed such as computer, projector, DVD and pattern making software, among others, should be made available by the government and stakeholders in education to improve and standardize institutions.
3. Workshops, seminars and conferences should be carried out periodically to provide more knowledge and training on the use of modern teaching technologies for students to be able to function effectively in the use of CAI in pattern making.

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