

Enhancing Academic Performance Through Textile Clothing Ergonomics: Investigating Praxis and Body Comfort Among College Students

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ABSTRACT

This study investigates the role of textile clothing ergonomics in enhancing academic performance among students of FCT College of Education, Zuba, Abuja. Clothing ergonomics refers to the design and functionality of garments that support comfort, mobility, thermal regulation, and physical well-being during daily activities. The study examines students' understanding and practices of textile clothing ergonomics, explores the relationship between body comfort and academic performance, and identifies strategies for improving ergonomic clothing practices among students. A descriptive survey research design was adopted. The population comprised 3,361 students drawn from five schools within the college. A sample of 357 students was selected using stratified random sampling. Data were collected through a structured questionnaire and validated by three experts in Textile Technology, Educational Research, and Measurement and Evaluation from FCT College of Education, Zuba and Federal University of Technology, Akure. The reliability of the instrument was determined through a pilot study using Cronbach's Alpha and a coefficient of 0.84 was obtained. The data were analyzed using descriptive and inferential statistics, while findings revealed that ergonomic clothing significantly influences students' comfort, concentration, participation in academic activities, and overall academic performance. It was recommended that the students should prioritize comfort, fit, and functionality when selecting clothing for academic activities alongside recommendations for students, educational institutions, clothing designers, and policymakers.

Keywords: Textile Ergonomics, Body Comfort, Academic Performance, Students, Clothing Design, Educational Outcomes.

Introduction

The learning environment encompasses several factors that influence students' academic performance, including physical, psychological, social, and environmental conditions. One often overlooked factor is clothing ergonomics. Textile clothing ergonomics concerns the interaction between clothing, the human body, and the environment to ensure comfort, safety, mobility, and efficiency during activities (Gupta and Zakaria, 2023).

Students spend several hours daily attending lectures, engaging in practical activities, and participating in extracurricular programmes. During these activities, uncomfortable clothing can cause thermal discomfort, restricted movement, fatigue, and distraction, thereby affecting concentration and learning outcomes. Ergonomically designed clothing enhances comfort and physical well-being, allowing students to focus better on academic tasks (Wang et al., 2022).

Recent studies have highlighted the importance of clothing comfort in cognitive performance, attention span, and psychological well-being among young adults (Li and Choi, 2024). Comfortable clothing contributes to reduced physical stress and improved learning experiences. However, there is limited empirical evidence regarding textile clothing ergonomics and academic performance among college students in Nigeria, particularly at FCT College of Education, Zuba-Abuja

This study therefore investigates the praxis of textile clothing ergonomics and its influence on body comfort and academic performance among students.

Statement of the Problem

Despite increasing awareness of ergonomic principles in educational environments, little attention has been given to the ergonomic properties of clothing worn by students. Many students select clothing based on fashion trends, affordability, or institutional requirements without considering

ergonomic factors such as fit, breathability, thermal regulation, flexibility, and comfort.

Poorly designed or uncomfortable clothing may lead to physical discomfort, reduced concentration, stress, fatigue, and lower academic engagement. In educational institutions where students spend long periods in classrooms and workshops, the effects of clothing discomfort may significantly influence learning outcomes. However, empirical evidence on the relationship between clothing ergonomics, body comfort, and academic performance among college students remains limited.

This study seeks to bridge this knowledge gap by examining the understanding and practices of textile clothing ergonomics among students of FCT College of Education, Zuba, Abuja, and determining its influence on body comfort and academic performance.

Objectives of the Study

- 1) Assess the current understanding and practices of textile clothing ergonomics among students.
- 2) Examine the relationship between clothing ergonomics, body comfort, and academic performance.
- 3) Identify potential strategies for improving textile clothing ergonomics to enhance academic performance.

Research Questions

- 1) What are the prevailing practices of textile clothing ergonomics among students?
- 2) What is the relationship between body comfort and academic performance?
- 3) What measures can be implemented to enhance textile clothing ergonomics among students for improved academic performance?

Literature Review

Textile clothing ergonomics encompasses various aspects, including garment design, fabric selection, and sizing, aimed at optimizing comfort and functionality for the wearer. From the submission of Nayak and Padhye (2021), Wang et al. (2022) and Parsons et al. (2010), textile clothing ergonomics involves designing garments that fit the body's physiological and psychological needs while ensuring comfort, flexibility, breathability, moisture management and functionality. Additionally, research by Lu and Luximon (2017) emphasizes the importance of incorporating anthropometric data and ergonomic principles into clothing design to accommodate diverse body shapes and sizes.

Body comfort refers to the state in which an individual experiences minimal physical discomfort and optimal thermal and physiological conditions. Comfort contributes significantly to cognitive functioning and productivity. Research by Smith et al. (2019) found a positive correlation between comfortable clothing and cognitive performance, suggesting that discomfort due to ill-fitting or restrictive clothing can impede concentration and productivity. Furthermore, studies by Watson et al. (2015), Kim et al. (2022), Jones and Leicht (2018) have demonstrated the impact of thermal comfort on cognitive function, highlighting the importance of breathable and temperature-regulating clothing for optimal academic performance.

Li and Choi (2024) reported that clothing comfort positively affects concentration, attention, and academic engagement among university students. Similarly, Chen et al. (2023) found that thermal discomfort resulting from inappropriate clothing negatively affects cognitive performance and classroom participation. Research by Park and Lee (2021) demonstrated that students who reported higher clothing comfort levels exhibited better attention spans and lower levels of fatigue during academic activities.

Gupta and Zakaria (2023) observed that ergonomic apparel contributes to psychological well-being and improved task performance. Comfortable clothing reduces physical stress, allowing students to focus on academic responsibilities. Research by Smith et al. (2019) found a positive correlation between comfortable clothing and cognitive performance, suggesting that discomfort due to ill-fitting or restrictive clothing can impede concentration and productivity.

Although limited, research examining the direct relationship between textile clothing ergonomics and academic performance has shown promising results. For instance, a study by Yang et al. (2016) found that students wearing ergonomic school uniforms reported higher levels of comfort and concentration compared to those wearing traditional uniforms. Similarly, research by Chen et al. (2018) demonstrated that providing ergonomic desk chairs and adjustable-height desks improved students' academic engagement and performance.

Fabric selection is a critical aspect of textile ergonomics, as different materials offer varying levels of comfort, durability, and performance. For example, breathable and moisture-wicking fabrics, such as cotton and synthetic blends, are often preferred for active wear and sportswear to enhance

comfort during physical activity (Lu and Luximon, 2017).

Parsons et al., (2010) added that fabric properties such as stretch, flexibility, and weight impact the garment's functionality and comfort. For instance, stretch fabrics are commonly used in athletic wear to provide freedom of movement and reduce constriction. Ergonomic garment design involves considerations such as seam placement, shaping, and construction techniques to optimize fit and comfort. Flat seams, for example, reduce friction and irritation against the skin, particularly in tight-fitting garments (Lu and Luximon, 2017). Features such as adjustable straps, elasticized waistbands, and ergonomic panels are often incorporated into clothing designs to accommodate diverse body shapes and sizes, enhancing overall comfort and usability (Parsons et al., 2010).

Recent studies recommend the adoption of breathable fabrics, proper garment sizing, flexible designs, and user-centered clothing production practices (Li and Choi, 2024). Educational institutions can also promote awareness programmes that educate students on the relationship between clothing comfort and academic performance.

Praxis refers to the practical application of knowledge or theory into action, including clothing selection, maintenance, and usage behaviours. Studies by Loker and Ashdown (2018) and Kim and Damhorst (2011) have highlighted the influence of personal preferences, socio-cultural norms, and environmental factors on individuals' clothing praxis. Understanding students' clothing behaviours is essential for identifying potential barriers to ergonomic clothing adoption and informing interventions to promote better practices. Clothing usage praxis encompasses how

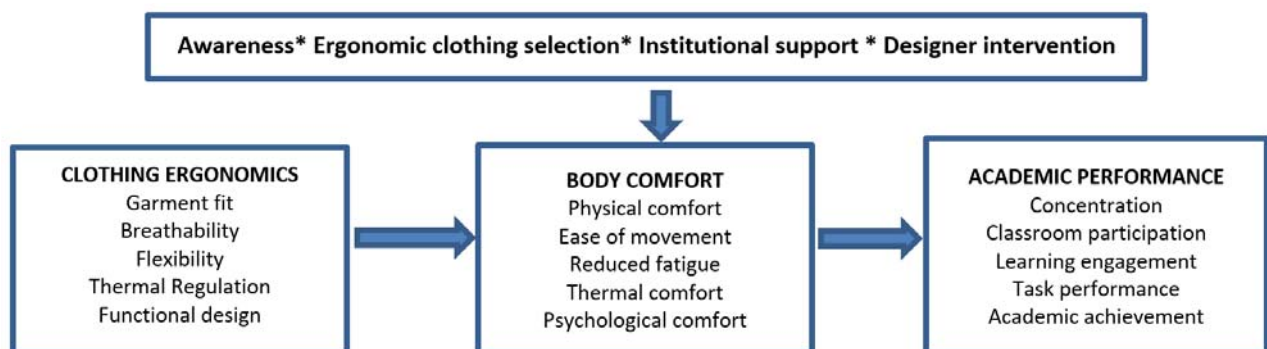
individuals interact with their clothing in everyday activities, such as dressing, undressing, and moving. This includes considerations of comfort, fit, and functionality during wear (Kim and Damhorst, 2011).

Loker and Ashdown (2018) remarked that, the clothing environment refers to the broader socio-cultural, economic, and environmental contexts in which clothing practices occur. This includes factors such as fashion trends, industry practices, sustainability concerns, and technological advancements. Individuals' clothing praxis is influenced by external factors such as media, peer influence, marketing, and societal expectations, shaping their attitudes and behaviours towards clothing (Kim and Damhorst, 2011).

Clothing selection praxis encompasses the process of choosing garments based on personal preferences, functional requirements, and socio-cultural influences which often shape individuals' choices and perceptions of appropriate attire in different contexts (Loker and Ashdown, 2018). Individuals consider factors such as style, comfort, occasion, climate, and self-expression when selecting clothing items (Kim and Damhorst, 2011). Clothing maintenance praxis involves caring for garments to preserve their appearance, functionality, and longevity. This includes practices such as laundering, ironing, repairing, and storing clothing items (Kim and Damhorst, 2011). Knowledge of fabric care labels, cleaning methods, and storage techniques influences individuals' clothing maintenance behaviours and practices (Loker and Ashdown, 2018).

Conceptual Framework

The conceptual framework (Figure 1) presents the expected relationship among the major variables of the study.



Note. Conceptual pathway: appropriate clothing ergonomics is expected to improve body comfort, which in turn supports students; academic engagement and performance. Researcher's work

Figure 1: Conceptual framework showing the proposed pathway from clothing ergonomics through body comfort to academic performance.

Clothing ergonomics is the principal explanatory variable and includes garment fit, fabric breathability, flexibility, thermal regulation, and functional design. Body comfort is positioned as an intervening variable because appropriate clothing is expected to reduce discomfort and fatigue and improve ease of movement and thermal comfort. Academic performance is the outcome variable and is reflected in concentration, classroom participation, learning engagement, task performance, and academic achievement. Awareness, ergonomic clothing selection, institutional support, and designer intervention are supporting factors that can facilitate the adoption of ergonomic clothing practices.

Methodology

The study adopts a descriptive survey research design. This design is suitable because it enables the collection of data from a large population regarding their perceptions, experiences, and practices related to textile clothing ergonomics and academic performance. The population comprised 3,361 students of FCT College of Education, Zuba, Abuja distributed across five schools:

1. School of Arts and Social Sciences
2. School of Early Childhood Care and Education and Primary Education Studies
3. School of Languages
4. School of Sciences
5. School of Vocational and Technical Education

The sample size is determined using Taro Yamane's formula where $n = \text{Sample size}$, $N = \text{Population}$ (3,361), $e = \text{Margin of error}$ (0.05). Therefore, 357 students constitute the sample. A stratified random sampling technique was employed. Each school represents a stratum, and respondents were selected proportionately from each school to ensure adequate representation.

The instrument for data collection is a structured questionnaire titled: "Textile Clothing Ergonomics, Body Comfort and Academic Performance Questionnaire (TCEBCAPQ)". The questionnaire contained four sections: Section A (Demographic Information); Section B (Understanding and Practices of Textile Clothing Ergonomics); Section C (Body Comfort Assessment); Section D (Academic Performance Indicators). Responses were measured using a four-point Likert scale: Strongly Agree (4), Agree (3), Disagree (2), Strongly Disagree (1). The instrument was subjected to face and content validity by three experts in Textile Technology, Educational Research, and Measurement and Evaluation from FCT College of Education, Zuba and Federal

University of Technology, Akure. Their observations and recommendations were used to improve the quality of the questionnaire. The content validity index of the instrument was found to be 0.87, indicating that the instrument adequately measured the variables under investigation.

To determine reliability, a pilot study was conducted using 30 students from a similar institution outside the study area. Data obtained were analyzed using Cronbach's Alpha reliability technique. The overall reliability coefficient obtained was 0.84, indicating that the instrument was sufficiently reliable for the study. Therefore, the questionnaire was considered suitable for administration to the respondents in the main study. Permission was obtained from the college authorities, while questionnaires were administered personally with the assistance of trained research assistants. Respondents were informed of the purpose of the study and assured of confidentiality. The data collected were analyzed using both descriptive and inferential statistics.

Research Question 1 was analysed by Mean and Standard Deviation. Research Question 2 applied Pearson Product Moment Correlation (PPMC) to determine the relationship between body comfort and academic performance and Research Question 3 used Mean and Ranking Statistics. The decision rule was mean score of 2.50 and above indicates agreement, while a mean score below 2.50 indicates disagreement.

Presentation of Results

The data collected from respondents were presented below:

Demographic Analysis of Respondents

The questionnaire collected demographic information on gender, school, and year of study. These variables are relevant because clothing practices and perceptions of comfort may differ across student groups.

Table 1: Distribution of Respondents by Year of Study

Year of Study	Frequency	Percentage (%)
100 Level	125	35.01
200 Level	118	33.05
300 Level	114	31.93
Total	357	100

Table 1 shows that 100 level students have the highest respondents with 35.01%, followed by 200 level and 300 level respectively having 33.05% and 31.93%.

Table 2: Distribution of Respondents by School

School	Frequency	Percentage (%)
School of Arts and Social Sciences	75	21.01
School of Early Childhood Care and Education and Primary Education Studies	72	20.17
School of Languages	70	19.61
School of Sciences	70	19.61
School of Vocational and Technical Education	70	19.61
Total	357	100

Table 2 revealed that, School of Arts and Social Sciences are more than the others with 21.01%, while School of ECCE and PES has 20.17%, and School of Languages, Sciences, Vocational and Technical Education have equal share of 19.61% each.

Table 3: Distribution of Respondents by Gender

Gender	Frequency	Percentage (%)
Male	177	49.58
Female	180	50.42
Total	357	100

Table 3 shows that, females are more populated with 50.42% of 180 than male 49.58% of 177 respondents.

Research Question 1: What are the prevailing practices of textile clothing ergonomics among students?

Table 4: Mean and Standard Deviation of Students' Responses on the Prevailing Practices of Textile Clothing Ergonomics among Students

Response	Weight (x)	Frequency (f)	Percentage (%)	fx
Strongly Agree	4	208	58.3	832
Agree	3	95	26.6	285
Disagree	2	36	10.1	72
Strongly Disagree	1	18	5.0	18
Total		357	100.0	1207

$$\bar{X} = \frac{\sum fx}{N} = \frac{1207}{357} = 3.38$$

$$SD = \sqrt{\frac{\sum f(x - \bar{X})^2}{N}} = \frac{264.20}{357} = \sqrt{0.740} = 0.86$$

The mean score of 3.38 exceeded the criterion mean of 2.50, indicating that students generally practice and understand textile clothing ergonomics. The standard deviation of 0.86 shows that respondents' opinions were relatively homogeneous.

Research Question 2: What is the relationship between body comfort and academic performance?

Table 5: Pearson Product Moment Correlation (PPMC) showing Relationship between Body Comfort and Academic Performance

Variables	N	Mean	SD	r-value	Sig. (2-tailed)
Body Comfort	357	3.38	0.86		
Academic Performance	357	2.96	1.14	0.62	0.000

Decision – Significant Positive Relationship

The results from Table 5 revealed a Pearson Product Moment Correlation coefficient of $r = 0.62$ between body comfort and academic performance. This indicates a moderate positive relationship between the two variables. The significance value ($p = 0.000$) is less than the 0.05 level of significance, indicating that the relationship is statistically significant. The implication is that students who experience greater body comfort through appropriate textile clothing ergonomics tend to demonstrate better academic performance. Therefore, improvements in clothing comfort may contribute positively to students' concentration,

classroom participation, and overall academic achievement.

Research Question 3: What measures can be implemented to enhance textile clothing ergonomics among students for improved academic performance?

The respondents agreed that all proposed measures could improve textile clothing ergonomics and subsequently enhance academic performance. Since all measures obtained mean scores above the

criterion mean of 2.50, they were accepted as viable strategies.

Table 6: Mean Ranking of Improvement Measures

Measure	Mean	Rank
Student awareness on clothing ergonomics	3.38	1st
Use of breathable fabrics	3.38	1st
Proper garment sizing	3.38	1st
Flexible garment designs	3.38	1st
Institutional awareness programmes	3.38	1st

Discussion of Findings

The study revealed that, many students possess moderate awareness of clothing ergonomics but often prioritize fashion and affordability over comfort. Findings indicated a significant positive relationship between body comfort and academic performance, suggesting that students who wear ergonomically suitable clothing experience better concentration, classroom participation, and learning outcomes.

For Objective 1, the findings of the study revealed that students possess a considerable level of awareness regarding textile clothing ergonomics and its importance in their daily academic activities. The high mean score of 3.38, which exceeded the benchmark mean of 2.50, indicates that respondents generally acknowledged the relevance of comfortable, well-fitted, and functional clothing in supporting their educational activities. This suggests that students understand that clothing choice extends beyond aesthetics and fashion to include considerations of comfort, mobility, and functionality. Furthermore, finding implies that most students consciously consider factors such as garment fit, fabric breathability, flexibility, and ease of movement when selecting clothing for school activities. Such awareness is important because clothing ergonomics contributes significantly to physical comfort and overall well-being.

Again, this finding is consistent with the work of Gupta and Zakaria (2023), who observed that awareness of ergonomic clothing principles among users enhances clothing satisfaction and promotes better performance in daily activities. Their study emphasized that clothing designed to accommodate human movement and physiological needs contributes positively to user comfort and efficiency. The finding also agrees with Nayak and Padhye (2021), who asserted that ergonomic clothing design focuses on ensuring proper fit, comfort, safety, and functionality. According to the

authors, users who understand these ergonomic principles are more likely to select garments that support their activities and improve their quality of life.

Therefore, the study suggests that students of FCT College of Education, Zuba, possess a reasonable understanding of textile clothing ergonomics and generally practice clothing choices that support comfort during academic activities.

For Objective 2, the findings revealed a positive relationship between clothing ergonomics, body comfort, and academic performance among students. The respondents agreed that comfortable clothing improves concentration, reduces fatigue, enhances classroom participation, and promotes better academic engagement. This indicates that body comfort serves as an important link between clothing ergonomics and students' learning outcomes. The finding suggests that when students wear ergonomically suitable clothing, they are less likely to experience physical discomfort that may distract them from learning activities. Comfortable clothing enables students to focus on lectures, participate actively in classroom discussions, and sustain attention for longer periods.

This finding supports the study of Li and Choi (2024), who found that clothing comfort significantly influences students' academic engagement and learning effectiveness. The authors reported that students who experience comfort in their clothing demonstrate higher levels of concentration and classroom participation. Similarly, the finding aligns with Kim, Lee, and Park (2022), who established that ergonomic clothing contributes to improved cognitive performance and productivity among young adults. Their study revealed that garments providing adequate fit and thermal comfort positively influence mental alertness and task performance.

The finding is further supported by Chen, Zhang, and Wang (2023), who reported that thermal discomfort negatively affects cognitive functioning and academic productivity. According to their study, physical discomfort resulting from inappropriate clothing may reduce attention span and hinder effective learning.

Consequently, the study confirms that body comfort plays a significant role in determining academic performance and that clothing ergonomics contributes to improved educational outcomes through enhanced physical and psychological comfort.

For Objective 3, the findings revealed several strategies that could improve textile clothing ergonomics among students. Respondents agreed that awareness programmes, the use of breathable fabrics, proper garment sizing, flexible clothing designs, and the promotion of ergonomic clothing practices could significantly enhance students' comfort and academic performance. The finding indicates that improving students' knowledge of clothing ergonomics and encouraging the use of ergonomically designed garments may contribute to a more conducive learning experience. It further suggests that educational institutions and clothing manufacturers have important roles to play in promoting clothing comfort among students.

In addition, finding agrees with Wang, Liu, and Chen (2022), who recommended the adoption of ergonomic textile materials that improve thermal regulation and user comfort in educational environments. The authors argued that breathable and flexible fabrics help reduce physical discomfort and improve user satisfaction. Meanwhile, this corroborates the work of Gupta and Zakaria (2023), who advocated for the integration of ergonomic principles into clothing production processes. Their study emphasized the importance of designing garments that accommodate users' physiological and functional needs to improve comfort and performance.

Furthermore, Li and Choi (2024) recommended educational interventions aimed at increasing students' awareness of the impact of clothing comfort on learning outcomes. According to the authors, awareness programmes can encourage informed clothing choices and promote better academic engagement. Therefore, the study concludes that improving textile clothing ergonomics through education, appropriate fabric selection, ergonomic garment design, and institutional support can significantly enhance body comfort and academic performance among students.

Limitations of the Study

The study has several limitations that should be considered when interpreting its findings. First, the study relied primarily on self-reported questionnaire responses; respondents may therefore have provided socially desirable answers or may not have accurately recalled their clothing practices and experiences of comfort. Second, the study was conducted in a single institution, FCT College of Education, Zuba-Abuja, which limits the generalizability of the findings to students in other institutions with different climatic, cultural, institutional, or dress-code conditions. Third, the

cross-sectional survey design identifies associations but cannot establish a causal relationship between clothing ergonomics, body comfort, and academic performance. Fourth, academic performance was assessed through questionnaire indicators rather than independently verified academic records. Finally, demographic subgroup analysis depends on the completeness and accuracy of the original respondent-level demographic data.

Conclusion

Textile clothing ergonomics is an important but often neglected factor influencing students' academic experiences. Comfortable and ergonomically designed clothing contributes to body comfort, improved concentration, reduced fatigue, and enhanced academic performance. Promoting awareness and adoption of ergonomic clothing practices among students can improve learning outcomes and overall well-being.

Recommendations

- 1) Students should prioritize comfort, fit, and functionality when selecting clothing for academic activities.
- 2) Educational institutions should organize awareness programmes on clothing ergonomics and body comfort.
- 3) Textile and fashion designers should incorporate ergonomic principles into garment production.
- 4) College management should encourage comfortable dress codes that support learning activities.
- 5) Further studies should investigate ergonomic clothing practices in other tertiary institutions across Nigeria.
- 6) Researchers should explore experimental approaches to establish causal relationships between clothing ergonomics and academic achievement.

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