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Evaluation Of Optimization Of Cycling, Recycling, And Upcycling Of Textile Materials For Environmental Impact And Maximizing Sustainable Fashion Among The Students Of Fct College Of Education Zuba-Abuja

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ABSTRACT : This research examined the optimization of cycling, recycling, and upcycling of textile materials to minimize environmental impact and maximize sustainable fashion practices among students. With the fashion industry's significant environmental footprint, exploring innovative approaches to mitigate its adverse effects is crucial. The study aims to assess students' knowledge, attitudes, and behaviours towards sustainable fashion, as well as the effectiveness of educational interventions in promoting textile recycling and upcycling. Through surveys, interviews, and studio exploration, data were collected to evaluate the implementation of sustainable fashion initiatives among students and their environmental impact. The research sought to identify barriers to sustainable fashion adoption and propose strategies for overcoming them. The findings revealed contribution to the advancement of sustainable fashion education and practice, empowering students to become agents of change in promoting eco-friendly clothing options and textile recycling. Ultimately, the research strives to foster a culture of environmental responsibility and sustainability within educational institutions, paving the way for a more environmentally conscious fashion industry.

KEY WORDS: Evaluation, Optimization, Cycling, Recycling, Upcycling, Textile Materials, Environmental Impact, Maximizing Sustainable Fashion

I. INTRODUCTION

The fashion industry is notorious for its significant environmental impact, with textile production, consumption, and disposal being major contributors to pollution and resource depletion. To address these challenges, the concepts of cycling, recycling, and upcycling have gained prominence as potential solutions for promoting sustainability in fashion among stake holders which students are a part. The fashion industry is one of the largest contributors to global environmental degradation, with textile production and consumption patterns exerting significant pressure on natural resources and ecosystems. In response to growing concerns about the industry's environmental impact, various strategies have emerged to promote sustainability, including the concepts of cycling, recycling, and upcycling of textile materials.

A major problem of environmental degradation caused by textile waste was noted by Rathinamoorthy (2019) in fast fashion which promotes cheap and less quality materials with a short life time. Ultimately these fabrics are produced with synthetic fibers and are expected to be discarded in time to give room for new collection. Hence, the impact of such waste on landfill is enormous. Additionally, the view of Cumming (2016) cannot be discarded when she mentioned that “the effect of exponentional growth of waste within long term decay time, toxic leaching and methane emissions, is significantly harmful to landfill areas. There is an environmental responsibility for designers and manufacturers to acknowledge this level of textile waste and address these issues with solutions that intersect the traditional design, production, and end-use systems or create new ones”. Hence, this research aims to evaluate the optimization of cycling, recycling, and upcycling of textile materials among students to minimize environmental impact and promote sustainable fashion practices.

Concept of Cycling : Cycling in the context of textile materials refers to the process of reusing a material or garment multiple times in its original form without altering its structure or composition significantly. This could involve wearing a piece of clothing repeatedly, using it until it reaches the end of its functional lifespan, and then either disposing of it responsibly or passing it on to someone else who can continue to use it (Thomas and Sharp, 2013).

Concept of Recycling : Recycling is the process of converting waste materials into reusable materials to create new products. In the context of textiles, recycling involves collecting used or unwanted clothing and other textile products, breaking them down into raw materials, and then using those materials to manufacture new textiles or other products. Fletcher (2016) pointed out that this process typically involves the following steps:

- Collection: Used textiles are collected from various sources, including individuals, businesses, and collection centers.
- Sorting: Textiles are sorted based on material type, colour, and condition to facilitate the recycling process.
- Processing: Textiles are processed through mechanical or chemical methods to break them down into fibers or other raw materials.
- Manufacturing: The recycled materials are then used to manufacture new textiles, clothing, or other products. Meanwhile, textile recycling helps to reduce waste, conserve resources, and minimize the environmental impact of textile production by giving new life to old materials.

Concept of Upcycling : Upcycling is a creative and innovative approach to reuse wherein old or discarded materials are transformed into new products of higher quality or value than the original. Unlike recycling, which breaks down materials into their basic components, Gwilt and Rissanen (2019) opined that, upcycling involves repurposing and reimagining materials to give them new life and functionality. This process often involves:

- Creativity: Upcycling encourages creativity and imagination to transform old materials into new and unique products.
- Resourcefulness: Upcycling utilizes existing materials in innovative ways, reducing the need for new resources and minimizing waste.
- Value Addition: Upcycled products often have added value, whether through artistic design, enhanced functionality, or unique features.

Meanwhile, Fletcher and Grose (2012) state that upcycling promotes sustainability by extending the lifespan of materials, reducing the demand for new resources, and minimizing waste generation. It encourages consumers to rethink their approach to consumption and embrace more eco-friendly and creative solutions. In a nut shell, while recycling focuses on converting waste materials into new raw materials for manufacturing, upcycling emphasizes creative reuse and transformation of old materials into new products of higher value and functionality. Both concepts play important roles in promoting sustainability and reducing environmental impact.

Statement of Problem : The fashion industry's conventional practices, characterized by resource-intensive production processes and high levels of waste generation, pose significant environmental challenges, contributing to pollution, resource depletion, and climate change. Within this context, the optimization of cycling, recycling, and upcycling of textile materials emerges as a critical solution for minimizing environmental impact and promoting sustainability. However, there remains a gap in understanding the effectiveness of these practices, particularly among student populations, who represent a significant demographic within the fashion consumer base.Despite growing awareness of sustainable fashion, many students continue to engage in consumption patterns characterized by short product lifespan and limited consideration for environmental consequences. This perpetuates the cycle of textile waste and exacerbates environmental degradation. Moreover, while educational interventions have been proposed as a means to promote sustainable fashion practices among students, there is limited empirical evidence on their effectiveness and impact on behaviour change. Therefore, the overarching problem addressed by this research is twofold: firstly, to evaluate the optimization of cycling, recycling, and upcycling of textile materials among students in the context of sustainable fashion; and secondly, to assess the effectiveness of educational interventions in promoting behaviour change and fostering a culture of sustainability.

Objectives

1. To assess the current knowledge, awareness levels and behaviours of students regarding cycling, recycling, and upcycling of textile materials in the context of sustainable fashion.
2. To explore educational interventions and practical training of students in promoting the adoption of cycling, recycling, and upcycling practices.

Research Questions

1. How does the current knowledge, awareness levels, attitudes and behaviours of students regarding cycling, recycling, and upcycling of textile materials in the context of sustainable fashion be assessed?

2. How can educational interventions and practical training of students be explored in promoting the adoption of cycling, recycling, and upcycling practices?

II. LITERATURE REVIEW

The fashion industry's environmental impact, stemming from its resource-intensive processes and waste generation, necessitates sustainable approaches to mitigate its consequences. This literature review synthesizes existing research on cycling, recycling, and upcycling of textile materials within the context of sustainable fashion, particularly focusing on student engagement and environmental implications. Cycling emphasizes extending the lifespan of garments through multiple uses. Studies such as those by Thomas and Sharp (2013) emphasize the importance of consumer behaviors in garment longevity. Their work underscores repair and care practices as pivotal in extending garment lifespan. Additionally, Black and Eckersley (2018) highlight the role of consumer education in fostering awareness of cycling practices. Textile recycling offers a promising avenue for waste diversion and resource conservation. Research by Fletcher (2016) underscores the significance of innovative recycling technologies in minimizing environmental impacts. Furthermore, studies like those by Birtwistle and Moore (2007) explore consumer attitudes towards textile recycling, highlighting factors influencing participation and perceptions of effectiveness.

Upcycling presents a creative solution to textile waste by repurposing materials into new products. Gwilt and Rissanen (2019) emphasize the aesthetic and functional potential of upcycled fashion, highlighting its role in promoting sustainability and consumer engagement. Similarly, Fletcher and Grose (2012) discuss design principles and consumer perceptions of upcycled fashion. Cycling emphasizes the importance of prolonging the lifespan of garments through repeated use and wear. Research by Fletcher (2016) highlights the environmental benefits of extending garment longevity, emphasizing repair and maintenance practices. Additionally, Thomas and Sharp (2013) stress the role of consumer behaviors in garment lifecycle extension, underscoring the potential for education and awareness initiatives to promote cycling practices. Textile recycling plays a critical role in diverting waste from landfills and conserving resources. Fletcher (2016) discusses innovative recycling technologies that convert used textiles into new fibers or materials, emphasizing the importance of technological innovation in advancing sustainability goals. Moreover, Birtwistle and Moore (2007) explore consumer attitudes towards textile recycling, identifying factors influencing participation and perceptions of effectiveness.

Upcycling offers a creative solution to textile waste by repurposing materials into new products. Gwilt and Rissanen (2019) highlight the aesthetic and functional potential of upcycled fashion, emphasizing its role in promoting sustainability and consumer engagement. Similarly, Fletcher and Grose (2012) discuss design principles and consumer perceptions of upcycled fashion, stressing the importance of creativity and innovation in driving sustainable design practices. Educational interventions play a crucial role in promoting sustainable fashion practices among students. Cooke and Tregidga (2016) emphasize the importance of hands-on workshops and experiential learning in fostering behavior change and empowering students to embrace sustainable fashion practices. Niinimäki et al. (2020) further highlight the role of community engagement and practical skills development in promoting sustainability within educational settings.

III. METHODOLOGY

This study employed a mixed-methods design, integrating qualitative and quantitative approaches. The population comprised students from the FCT College of Education, Zuba Abuja, spanning six departments: School of Arts and Social Science, School of Early Childhood Care and Education and Primary Education Studies, School of Languages, School of Sciences, and School of Vocational and Technical Education. Using Krejcie and Morgan's sampling technique, 265 participants were randomly selected. To promote sustainable fashion, students were divided into groups for training on cycling, recycling, and upcycling of textile materials through studio exploration. Data collection involved surveys using questionnaires with 15 items, employing a 4-point Likert scale to assess students' knowledge, awareness, attitudes, and behaviours toward textile cycling, recycling, and upcycling. Studio exploration served as an educational intervention to enhance students' understanding and engagement with sustainable textile practices.

IV. DATA ANALYSIS

Research question 1: How does the current knowledge, awareness levels, attitudes and behaviours of students regarding cycling, recycling, and upcycling of textile materials in the context of sustainable fashion be assessed?

The ranking rate on table 1: Assessment of current knowledge, awareness levels, attitudes and behaviours of students regarding cycling, recycling, and upcycling of textile materials toward sustainable fashion.

S/N	Items	Mean	Remarks
1	You are familiar with the concept of sustainable fashion?	2.37	Rejected
2.	You have purchased clothing specifically labeled as sustainable or eco-friendly?	2.26	Rejected
3.	Do you actively participate in textile recycling programs?	1.23	Rejected
4.	Creativity motivates you to recycle textile materials	1.19	Rejected
5.	Are you familiar with the concept of textile upcycling?	1.28	Rejected
6.	Have you ever upcycled old clothing or textiles into new products?	2.09	Rejected
7.	You have positive thoughts on the fast fashion industry and its environmental impact?	1.15	Rejected
8.	You consciously try to avoid purchasing fast fashion items?	2.05	Rejected
9.	Cost considerations impact your willingness to purchase sustainable clothing options?	3.15	Accepted
10.	Your peers influence your clothing purchasing decisions?	3.10	Accepted
11.	Social media influence your perceptions of sustainable fashion?	3.28	Accepted
12.	You have attended workshops or educational sessions on sustainable fashion?	0.81	Rejected
13.	If yes, was the topic covered include in future educational sessions?	0.78	Rejected
14.	You plan to incorporate more sustainable fashion practices into your lifestyle in the future?	3.67	Accepted
15.	You intend to make changes and to promote sustainability in your clothing choices and behaviours?	4.21	Accepted
	Grand mean	**2.17**	**Rejected**

Source: Researcher: Field work (2024)

Table 1 portrays the response on assessment of current knowledge, awareness levels, attitudes and behaviours of students regarding cycling, recycling, and upcycling of textile materials toward sustainable fashion. High Mean Scores (4.21 - 3.67) indicated readiness of students to readiness to adopt sustainable fashion behaviour. Moderate Mean Scores (3.28 - 3.15) suggest that cost, social media and peer pressure influence students perception toward sustainable fashion. Lower Mean Scores (2.35 - 0.78) reveal that, students current knowledge, awareness levels, attitudes and behaviours regarding cycling, recycling, and upcycling of textile materials toward sustainable fashion is limited.

Research question 2: How can educational interventions and practical training of students be explored in promoting the adoption of cycling, recycling, and upcycling practices?

Studio Exploration 1:

- **Training on collection of worn-out clothes**: A designated bucket with the inscription "Drop Your Worn-Out Clothes" was placed at the college entrance, encouraging students to discard old garments. Students then visited the community to collect offcut fabrics and unused clothing from tailors and roadside fashion designers.
- Clothing swap events: Collected fabrics were organized by colour combination, facilitating a clothing swap among students.
- Creating cycling fashion collections: Fabrics were sorted out especially 100% cotton materials which are faded in colour with weak yarn. They were decoloured through resist method of fabric decoration process (tie-dye, batik and starch paste). Some fabrics were embellished with direct application of acrylic, especially areas that were identified as weak yarn area. Also, printing of paste on some fabrics were done to give a new look.
- Recycling fashion collections: Some fabrics were identified as torn and pieces of clothing were sorted out for this task. They were cut and reshape to give new style. Some pieces were laid over others to form applique type and were eventually styled with other forms evolving new image. Sewing machine was used to sew different parts together to form a complete garment suitable for wear.

- Upcycling fashion collections: Old fabrics were repurposed into new, high-value fashion items. Students followed pattern styling drafts to recut and combine fabrics, stitching upcycled cutouts into innovative garments

V. DISCUSSION

The study revealed alarmingly low levels of knowledge, awareness, attitudes, and behaviours among students regarding sustainable fashion practices, specifically cycling, recycling, and upcycling of textile materials (Objective 1). However, after participating in practical training, students demonstrated readiness to adopt sustainable lifestyle changes. Objective 2 focused on implementing student-led sustainable fashion initiatives, including clothing swap events, creating upcycled fashion collections, and participating in textile recycling drives. This hands-on approach provided valuable insight into students' practical application of sustainable fashion principles, enhancing their understanding of cycling, recycling, and upcycling textile materials.

VI. RECOMMENDATIONS

The study recommends the followings:

- Curriculum Development: There should be a review of textile design course in the higher institutions of learning to cater for textile sustainability courses, introducing formal courses on sustainability in textiles, with a focus on recycling and upcycling. Topics can cover environmental impacts of textile waste, circular economy principles, and sustainable production methods.
- Industry Partnerships: There should be collaborations with Textile Recycling Centers or local industries to allow students to visit, intern, or work on real-world textile recycling projects.
- Apprenticeships in Sustainable Fashion: Develop apprenticeship programs with fashion brands or textile manufacturers that are involved in sustainable practices. This provides students with direct industry exposure.
- Innovation Challenges and Competitions: Organize annual or semester-based competitions where students are tasked with creating fashion collections or textile products entirely from recycled or upcycled materials.
- Integration of Technology and Research: Teaching students how to use technology such as digital design software, AI, or 3D printing to aid in the development of upcycled products or to reduce textile waste.
- Research and Innovation Projects: Encourage students to engage in research projects on new materials, recycling methods, and ways to reduce environmental impact in textiles.
- Community and Environmental Engagement: Organize programmes where students collect textile waste from their communities and work on recycling or upcycling those materials into useful products.
- Environmental Awareness Campaigns: Students can be involved in campaigns to raise awareness about textile waste, the importance of recycling, and the benefits of upcycling.

VII. CONCLUSION

The significance of cycling, recycling, and upcycling of textile materials in promoting sustainable fashion practices among students has become a trendy reality in both fashion and environmental sustainability. Consumer behaviors, technological innovations, and educational interventions emerge as key drivers of change in the fashion industry. Moving forward, further research is needed to explore the effectiveness of specific interventions and strategies in maximizing student engagement and environmental impact within the realm of sustainable fashion.

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