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An Institutional Approach to Sustainable Fashion : A Case Study of Zero Waste Fashion

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Abstract

The apparel brands and retailers are taking more responsibilities for their environmental impacts for sustainable fashion. According to the rise in demand, the more fashion schools, colleges and universities are reacting to these changes and educate students to have more awareness of sustainability to take forward into changing the industry. Zero waste is one of the sustainable approaches to facilitate material efficiency by minimising fabric waste, and it can be applied to the design stage, the pattern cutting, fabric cutting, and production stages. This study is focused on evaluating the zero waste design module in BA Fashion Design course in UK high education. The teaching approach, materials, and structure of the designed module were analysed using action research as well as questionnaire conducted by students. The assignments of students based on the practice-based learning were evaluated, and reflections from students were also analysed. The results were interpreted as a guideline for a new focus on optimised curricula about the technical practice of zero waste.

Keywords: Fashion education, Sustainable education, Zero waste fashion

1. Introduction

The fashion industry is one of most unsustainable businesses influencing the environmental pollution using a large amount of energy and water also using non-ethical treatment of factory workers. There is no doubt that sustainable fashion is one of the hot issues increasingly delivered in media. More clothing companies are considering their manufacturing process less harmful on the environment and ethically produced, and also consumers are more aware of sustainable fashion and consumption.

There are many sustainable design strategies during clothing manufacturing such as Design: a design for low-impact materials and well-being, Production: a design for durability and efficient use of materials, and Distribution: Design to minimise transportation and reduce packaging (Gwilt, 2018). Fashion designers and garment makers should concern the social and ethical issues as well as economic necessities and should be aware of sustainable design strategies to more environmentally, socially and ethically conscious production (Green Strategy, 2019).

Therefore, more fashion schools and universities address negative impacts from fashion industries and have a curriculum focused on making and marketing sustainable fashion design. This contemporary trends in sustainable fashion design education is a future demand and must be strengthened for both human and natural environment. Fashion designers and garment makers should be educated through a creative sustainability curriculum focused on responsible design and production to become assistants to improve the current situations and to change the environment and society sustainably.

In this paper, the module in Fashion Design in the UK high education covered with zero waste fashion design, one of sustainable design strategies for the production, will be critically analysed and reviewed its impacts on students. In addition, the optimum curriculum based on the results and analysis is also to be suggested.

2. Background

Sustainable fashion education and Zero Waste

Education for sustainable development (ESD) is a theme of UNESCO's 'Education for the 21st Century' (UNESCO, 2014). Higher Education Academy in the UK supports ESD to promote teaching excellence in institutions, and Higher Education Funding Council for England (HEFCE) published 'Sustainable development in HE resource guide' the online sources and toolkit for education. Some UK universities have sustainable research centre such as Centre for Ecology, Environment and Sustainability in Bournemouth University, Centre for Sustainable Communities Achieved through Integrated Professional Education (C-SCAIPe) in University of Kingston, the Communities, Culture and Sustainability in University of Chester, and Education for Sustainable Development in University of Plymouth (HEFCE, 2009). Sustainable fashion focused research group are also found; Centre for sustainable fashion in London College of Fashion and the Clothing Sustainability Research Group in Nottingham Trent University.

The sustainable modules or courses are increasing due to sustainability has attracted growing attention in higher education. The school for Cross-faculty Studies Liberal Arts in the University of Warwick has a module named 'Sustainability' for the 2nd year which provides 20 workshops. The assessments are two 2,000 words paper and critical essay, portfolio, presentation, exam. Bournemouth University has a short course named 'Sustainable Development in Practice' within ten weeks open to anyone with a relevant undergraduate degree. As for sustainable fashion, Kingston University has a Sustainable Fashion MA course has a module named 'Sustainable Design Principles, Perspectives and Practices'. The module content includes sustainability and sustainable development, and histories, theories and practice of design for sustainability and design development. The assessment is a 5,000-word essay and oral presentation. The school of Art, Architecture and Design in London Metropolitan University provides 'Sustainable Practice' module in the MA course, and two final assessment are analytical case studies and presentation weighting both 50%. London College of Fashion, UK is delivering a Masters level fashion education course in sustainability since 2008: MA Fashion Futures and MA Fashion and the Environment.

Zero waste is a design technique that not only eliminates textile waste but also re-uses and remodels as another piece at the design and manufacturing stage (Rissanen and McQuillan, 2015). Zero waste has become a legal requirement in the manufacturing industry to produce less waste, and this growing needs for more sustainable consideration with less waste in the fashion industry encourage zero waste design as the new creative direction. Therefore, it becomes more important that the fashion industry finds ways to produce in this way and also fashion educators consider this issue onto their education.

Zero Waste Fashion Design Module

In the second year of Fashion Design at Birmingham City University, Zero waste is one of the options with 20 credits onto the 60 credits module 'Advanced practice'. This module is focused on practice-based learning in order to gain new knowledge by doing practice and achieve the outcomes from the practice (Creativity & Cognition Studios, no date). In addition, learner-centred learning through practice is considered to make students national, industry and institutional drivers (DfES, 2003).

Within 2017-2018, the eight times (twice per week through four weeks) of session were provided. The module aimed to understand the key perspectives that inform the various aspects of sustainable fashion and, also to introduce a range of theoretical and practical methods of zero waste approach. It focuses on the development of design-based research skills and capabilities of a zero waste approach by

producing a capsule collection. The teaching and learning strategy comprise a mix of lecture, practical skills-based workshop and project work. The lecture explores concept, principles, methods and processes of sustainable design and, also zero waste techniques. Practice-based project work focuses on the relevant design development and students work individually to develop their project. In 2019-2020, the contents of zero waste was introduced to student

3. Methodology

Within this study, a case study and action research were applied to find out the optimum curriculum about sustainable fashion design comparing the curricula. Action research assisted in the improvement of the condition and support to seek out the methods which can provide an enhanced quality (Advance HE, no date).

Two sets of data were used to find out the optimised curriculum: (1) module contents, (2) Students evaluation. These are detailed as below:

(1) Module contents, teaching materials, and final outcomes and portfolio. The data were collected from students' submitted documents and photographs taken at the sessions.

(2) Students evaluation. Level 5 BA Fashion Design students were chosen for conducting a questionnaire by purposive sampling. The questionnaire was designed by with reference to Wadham at the Oxford Learning Institute, and it had both open and closed questions (list question, category question, and Likert question) (Oxford Learning Institute, no date).

This study used a mixed method combined with quantitative and qualitative analyses. The results of the questionnaire were analysed by frequency analysis, and open-ended questions were analysed by contextualizing data analysis. Then, both quantitative and qualitative data were interpreted by deriving their relation and conclusion.

This study followed the British Educational Research Association (BERA) guidelines and met with the university ethical clearance procedures to use the participants' data with anonymity.

4. Results and Discussion

Overview of the module

Zero waste module aimed to provide opportunities to conduct experiments with zero waste techniques for pattern cutting and garment construction, and also to support further knowledge of ethical and sustainable fashion design. The teaching and learning strategy comprised a mix of lecture, practical skills-based workshop and project work. The lecture explores concept, principles, methods and processes of sustainable design as well as zero waste techniques. Activity-based project work focuses on relevant design development, and students work individually to develop their project. Student learning activities were exploration, experimentation, conceptualisation, realisation, and reflection. The given time of the module from design to garment development was eight sessions with six hours.

Zero waste in 2017

The first session in 2017 was the brief of sustainable garment construction and zero waste design by providing examples of previous works. From Session 2 to 4, students developed their final pattern by completing at least three experiments. Students were encouraged to use fabric in the way of sustainable such as fabric waste, ethical fabric, and upcycling fabric. As for the techniques to be adopted for the fabric development was embroidery, embellishing, weaving and knitting including zero waste pattern

cutting. Students created their one final garment by the end of Session 7, and presentation was delivered at the last session.

Regarding students' outcome in 2017, fabric sourcing materials which students chose were mostly recycled materials and old fabrics such as sofa cushion, clothes, bed sheet, and shower curtain. Students also used waste and scrap fabric taken from other projects. As for pattern cutting techniques, almost one-third of students used draping techniques including fabric folding, and three students tried to use minimal cutting techniques. Most of all students were more concerned about the fabric embellishments such as weaving, embroidery, dyeing, digital textile development, and quilting (see Figure 1).



Figure 1. Students' final outcome in 2017.

Zero waste in 2018

Session 1 was more focused on understanding sustainable fashion and zero waste pattern cutting techniques theoretically. Firstly, a lecture about the garment manufacturing process from the design concepts to the production stage which can facilitate material efficiency and the waste reduction was delivered. Design efficiency about fabric and pattern optimisation were emphasised to make students try creative pattern cutting and zero waste design. Next, various zero waste techniques were delivered; draping, cut and drape, creative pattern cutting, subtract cutting, minimal cut, geo cut, tessellation, jigsaw, multiple cloth approaches, and using technology. The principles of each technique were explained how to be constructed and how to be fit to the zero waste pattern cutting by showing the example of garments. At the end of the session, it was asked to students to research sustainable/ ethical fashion design examples and to review zero waste principles. Session 2 was delivered to have more experiments using various zero waste techniques. Students started with playing with the piece of fabric to drape the shape without cutting fabric, and cut fabric stage by stage to form the intended shapes if it was necessary. Subtract cutting was also tested by using the quarter scale of body block. Then students used a piece of A4 paper to create garment shape by applying the geo cut, tessellation, and jigsaw techniques. Students were asked to do design development using one of the experimental techniques and find appropriate fabrics for the development (see Figure 2).

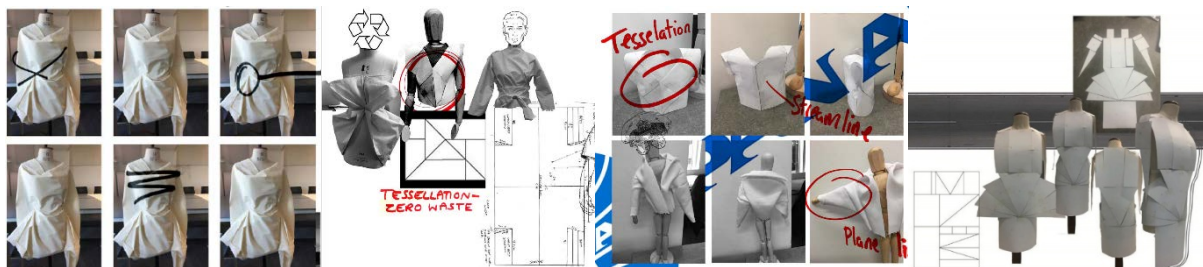


Figure 2. Experiments of zero waste techniques by students in Session 2.

Session 3 was focused on completing different zero waste experiments and deciding the final technique to adopt for toile development. From Session 4 to 5, tutor encouraged students to develop pattern using chosen zero waste technique with appropriate fabric. Students were requested to record the experiments and development process with images and annotation. Next, fully finished toile and pattern were completed by the end of Session 7, and final toiles were photographed with proper styling and modelling. At the last session (Session 8), students showed the final outfit on a stand and presented the design and pattern development process. The tutor gave the formative assessment after the presentation.

As for the final outcomes in 2018, students were more focused on pattern cutting techniques rather than fabric development due to the module aim request. The most used zero waste technique was geo cut/ jigsaw/ tessellation. Students tried to fit each pattern piece to be fit within the fabric width not to have any waste. Also, garments with minimal cut, draping, and multifunctional were followed. Sustainable fabric consideration such as organic fabric, scrap, and the old duvet was also shown (see Table 1).

Table 1 Students' final outcome in 2018

| Minimal cut/ Draping | |
|---------------------------------------|--|
| | |
| Jigsaw/ Tessellation | |
| | |
| Minimal cut / Jigsaw/ Multifunctional | |
| | |

It was found that the emphasised sustainable strategy was different between 2017 and 2018. The material development and fabric choice were more considered in 2017 whereas more variety of zero waste techniques were provided, and all students used zero waste pattern cutting techniques for their final outcome.

Module evaluation in 2018

The first and second questions, 'The lessons were interesting' and 'The lessons were well structured' were responded positively with both 78.6% students.

When lecturer's performance asked, feedbacks about teaching material and visual aids were evaluated positively with 57.1% and 71.4% agree and using enough examples was evaluated very positively with 42.9% of strongly agree. It was found that the given lecture used PowerPoint with examples of different techniques and finished garments was very efficient (total 93 % of agree and strongly agree). Regarding the question 'The module built on my existing knowledge', 50% of students answered positively. It was reported that some students were disappointed that the module was more focused on manufacturing rather than the design aspect; therefore, the students who like design rather than making evaluated the module as less helpful. However, the majority of students evaluated the module was worthwhile and satisfactory (both 85.7 %) When asked about the level of the module difficulty, all students mentioned that the level was 'About right'. However, 11 among the total 14 students responded that the pace was 'Too fast', and this was similarly evaluated at the open-ended question as below.

"I wish we had more time to explore printing techniques. Rushed experimenting and decisions."

"The course was very well structured and balanced, but I would have liked more time."

"Very interesting subject but not quite enough time to fully explore it."

It can be said that four weeks of the module including design development to manufacturing was rather tight to students.

However, the majority of students evaluated this module was challenging but interesting. Also, it was found that this module enlightened students to understand sustainable fashion and manufacturing — some students' feedbacks as below.

"Zero waste was my favorite project because of the new skills and insight I had gained from the various techniques that are now massively being used in industry. This option will benefit me massively throughout my career."

"This option for me was very interesting as it enabled me to learn a new way to pattern cut, coupled with the ability to learn how to work in a more efficient way and to reduce fabric and material wastage."

"This project was really eye-opening for me since I have been introduced to a sustainable way of living, I truly can't see myself going back to my old habits. I believe that this option is the best option for me to take further onto my final year. I have a true passion for making the fashion industry rise into 100% eco-friendly."

4.4 Module development

Module specification

It was found that zero waste fashion module should be combined the textile development considering surface design including design development and zero waste pattern cutting techniques together. The module credits will be suggested having a more credits and more sessions.

The modified learning outcomes focused in sustainable development about are as below.

1. Articulate ideas in relation to a broadening range of practical and technical research within sustainable development.
2. Practise advanced level of sustainable thinking and application to creative and technical exploration, apply further knowledge and understanding of processes, methods and materials in circular fashion manufacturing.

3. Employ zero waste pattern cutting techniques to evidence creative problem-solving.
4. Apply individual practical investigation in order to develop professionally presented outcomes.

Suggested Sessions for the Design Development

Surface and textile design can be considered as the driving force of a sustainable collection. Students will create surface design through the exploration of sustainable textile development and will produce a collection of textile samples including one finalised textile piece. Students will be encouraged to use upcycling, and recycling fabrics such as clothing waste, second-hand clothing, textile swatches, sampling yardage, and textile scraps as well as factory surplus waste leftover generated during garment manufacturing. The field research for fabric sourcing is to be planned by visiting 'The Scrapstore' in Birmingham. The scrapstore officially opened in October 2011 and supports the reuse of unwanted materials that have been donated by businesses and individuals across Birmingham. They redistribute waste and surplus materials to out of school providers, schools, community groups and individuals. Students can have a chance to create their textile by using a different type of material because the Scrapstore has various type of fabric, felt, and wool as well as a different supply of materials such as packaging, containers, foam, wood, plastics, cardboard, and paper and so on. The variety of textile development techniques including fabric manipulation will be introduced; kitting, pleating, smocking, patchworking, shredding, quilting, embroidery, laser cutting, and 3D printing.

Suggested Sessions for the Design realisation

The contents of the manufacturing part will be similar to the previous two years. The pattern cutting techniques delivered were draping, minimal cut, creative pattern cutting, tessellation, and jigsaw. However, the suggested module will cover the reconstruction of the garment and the multiple cloth approach as well. Each technique will be introduced by PowerPoint presentation with a variety of examples as same as the previous year because of positive elevation from students. Also, each technique will be demonstrated by a tutor, and students can do their own experiment based on introduced techniques.

Suggested Sessions for the Module structure

The traditional garment manufacturing process was started from design development and fabric was chosen, then the pattern cutting and manufacturing were followed. Therefore, garment development module also has followed by the same sequence of the traditional making process. However, due to the differentiated approach of the garment manufacturing applied by the techniques of zero waste pattern cutting considering the efficiency in fabric use by reframing fabric, the zero waste is introduced prior than design development.

The first week is started with the lecture about theory and principle about sustainable fashion, circular design strategies, and zero waste pattern cutting techniques. Next, 3D workshop to introduce the different technique of zero waste pattern will be delivered through two sessions. Then, the session will go to the textile and design development and come back to the manufacturing with developing finalised design's pattern and garment. Apart from the regular sessions, technical workshops such as pocket making and zipper attachment for the detail of the garment will be additionally provided.

5. Conclusion

This study evaluated the zero waste design module in BA Fashion Design at Birmingham City University by analysing the curriculum and students feedback. Overall, the results of the study provided some important insights into sustainable education. Firstly, it was found that the designed zero waste module including lecture, experiment, and practice was considered successful. However, the module with a

more given time of sessions including both sustainable fabric development and application of zero waste pattern cutting techniques was suggested. This study also proved how sustainable education influenced fashion design students in positive ways by providing the significant results of students feedback. Most of the students evaluated that the module was interesting and valuable. It is concluded that zero waste design contributes to having future fashion professionals who are aware of sustainable development in the fashion industry. As the fashion industry continues to seek sustainable development, fashion education also should consider this need and provide appropriate materials to students.

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