Chapter 7
Revolutionizing Fashion Education With Integrating AI and 3D Design for a Sustainable Future

Nikita Singh
https://orcid.org/0000-0001-5493-4640
Lovely Professional University, India

Jyoti Rani
https://orcid.org/0000-0002-5577-7808
Lovely Professional University, India

ABSTRACT

By encouraging sustainability, fostering creativity, and providing aspiring designers with state-of-the-art resources, the incorporation of AI-driven 3D design into fashion school is revolutionizing the sector. Through virtual prototyping, these technologies allow students to design, test, and improve clothing without the need for physical materials, reducing waste and carbon footprints. Additionally, AI improves circular fashion, supply chain optimization, and trend forecasting, promoting moral and effective manufacturing techniques. This method equips students to handle the demands of a quickly changing, technologically advanced, and environmentally conscious fashion business by democratizing access to design tools and promoting interdisciplinary learning.

DOI: 10.4018/979-8-3373-5102-5.ch007

INTRODUCTION

Everything that is old has now become new again; there has been unprecedented pressure on the fashion industry to adopt measures of sustainability with climate issues bubbling away to the surface. Schools understand the potential of this shift because they can include up-and-coming technologies, such as AI-powered 3D models into the curriculum. In this chapter we will expand on why this integration matters, how it is organic to the future of fashion design and production. The fashion industry has started to embrace "sustainable fashion," the term for a more eco- and socially responsible path to fashion. It outlines many ways we can mitigate some of the damage from clothing producing and consuming (Sehnem et al, 2024).

ROLE OF AI AND 3D DESIGN IN REDUCING WASTE AND CARBON EMISSIONS

By mining vast amounts of data, A.I. can predict trends in fashion, helping companies create collections that align with consumer preferences while also limiting waste and overproduction. By examining materials and design patterns, AI systems can help to optimize resource use and significantly reduce waste in the production process. The production of multiple design alternatives by AI using initial constraints is commonly described as "generative design" (Casciani & D'Itria, 2024).

Share This Article 3D printing, also known as additive manufacturing, uses only the material necessary to create an object, eliminating excess waste compared to traditional subtractive manufacturing processes, which cut away material from a larger block. Because AI can help predict and model the lifecycle of a product, designers can create items that are not only efficient to resources but also easier to dispose of or repurpose when their useful lives are nearing an end. Some businesses, using artificial intelligence (AI) to analyze customer behavior and preferences, are able to decrease overproduction and the resulting waste by producing only what is necessary (Saad Alotaibi et al., 2024).

Textile manufacturing is very thirsty. Producing cotton, a frequently worn fabric, uses a lot of water. A pair of jeans can consume as much as 10,000 liters of water to manufacture. It's not just about water use, however. Another major cause of the ecosystem destruction is dying. The dyes contain harmful chemicals that are toxic to water and aquatic organisms. Fashion has not historically been especially ecologically sound. During the manufacturing cycles, especially so with synthetic materials, a high amount of greenhouse gasses is released. Would you believe that fashion accounts for 10% of the planet's entire carbon footprint — more than both international travel and shipping combined? (Casciani & D'Itria, 2024)