

From Waste to Wonder: Empowering Children's Learning Through Sensory-Infused Apparel

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Keywords: Pedagogy, Activism, Waste management, Africa

Introduction. Human consumption of goods wrapped in plastic and subsequent lack of proper waste management have caused environmental issues for multiple animals on or around the continent of Africa (Jambeck et al, 2018). Land animals are affected by ingesting the waste products which in turn cause digestion issues. Although marine animals also ingest plastic waste, plastic waste affects them in their nesting areas and trapping them by entanglement, preventing their return to the surface for air or escape from predators (Girma, 2022). Believing that our children will be who inherit this problem and thus take action to cure it, design research was constructed to use pedagogical theory of multisensory learning (Shams and Seitz, 2008) to best engage children in obtaining the knowledge about the issues so they might be impassioned to be the cure. The research questions we asked were: (1) How can a garment collection be effectively used as an educational tool to increase children's awareness about environmental issues in Africa? (2) In what ways can the principles of multisensory pedagogy be incorporated into the design of children's wear to enhance learning and engagement? (3) What are the most appropriate materials to be utilized in the creation of this collection to ensure effective education and visual appeal for children? The Three-Step Design Process model created by LaBat and Sokoloskwi (1999) outlined the steps followed during the design process.

Design Process. *Step 1: Problem definition and research.* Shams and Seitz in 2008 proved that the multisensory approach in learning improved children's retention. This approach is particularly beneficial because it accommodates diverse learning styles by providing multiple stimuli. By presenting information through different sensory channels, children are able to process the information in chunks, storing it short-term, building a strong foundation for long term retention (Bagui, 1998, as cited in Shams and Seitz, 2008). When presented with conflicting sensory inputs, children may experience confusion and a decrease in retention. Cohesive sensory inputs allow for better processing and thus better retention. Based on the pedagogical theory, the authors conducted an exploration of various materials and techniques, ultimately identifying upcycling plastic wastes as the primary materials for the collection, in order to create optimum learning environment.

Step 2: Creative exploration. Three endangered animals were chosen for creative design: the elephant, the giraffe, and the sea turtle. The animal of choice was featured in each of the children's wear garment. Multiple construction and sewing techniques, such as crocheting, wet and needle felting, hand and machine quilting, patchwork piecing, and weaving were explored to encourage engagement with the garment. For cultural connection to the area of concern each garment incorporated authentic African printed fabrics sourced from an African vendor at a local quilt show. Additionally, plastic waste in the form of single use bags, packing materials, fruit netting and candy wrappers were collected by one of the

authors with her children. The goal of this stage of the design was to explore the interplay between materials, garments, and design concepts, while also identifying sensory channels that could be leveraged to enrich the learning experience of children.

Step 3: Implementation. Three children's wear were completed in the Implementation stage. The elephant design combined crocheted plastic flounce sleeves (Figure 1), with hand quilting and plastic straw weaving to represent a profile of a cartoon elephant with a tusk spraying water. The giraffe dress was specifically designed to represent the country of Namibia, where a majority of the giraffes reside (Hartman, 2022). The Namibian survival and resilient spirit provided the inspiration for the giraffe dress. The Namibian people not only survived genocide of early 20th century but have absorbed the style of dress of their oppressors as a form of resilience (Naughten, 2013). Their style also incorporates patchwork quilting which adorns the skirt of giraffe dress, candy wrappers are the heart of the log cabin block made of African prints (Figure 2). As a wool felted and quilted giraffe creates a halter neck, fruit netting overlays colorful fabric bits on the bodice of the dress. The sea turtle dress, was designed around the dangers of newly hatched sea turtles from their sandy nest to their mother, waiting in the depths of the ocean. Plastic packing materials and single use bags were crocheted into seaweed (Figure 3). The turtles were wet felted wool, topped with crocheted cording – a thrift store find.



Figure 1. Details of crocheted plastic used as sleeves.

Figure 2. Details of candy wrapper used as center of patchwork.

Figure 3. Details of crocheted plastic used as seaweed.

Conclusions. The resulting designs successfully achieved the design goal of upcycling plastic wastes and second-hand materials into an engaging collection of children's wear. Throughout the design process, research questions were addressed and resolved. The embellishments created from plastic wastes provided auditory, tactile and visual sensory experiences for children when they interacted with the collection. In addition, the colors and the prints of the fabric provided a visual sensory experience, while the garment's silhouette and styles enhanced the kinesthetic sensory experience. The collection offers multiple sensory inputs for children to explore as they learn about the African continent, their people, the animals and the dangers of mismanaged plastic. This design research demonstrated an innovative approach to leveraging apparel design as an educational tool to enhance the learning experience of children and promote engagement through education. The upcoming study will concentrate on assessing the educational impact and gathering perspectives from both children and educators.

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