International Journal of Modern Education
IJMOE
EISSN: 2637-0905
Volume 6 Issue 21 (June 2024) PP. 01-18
DOI: 10.35631/IJMOE.621001

INTERNATIONAL JOURNAL OF MODERN EDUCATION (IJMOE)
www.ijmoe.com

GLOBAL ACADEMIC EXCELLENCE

THE AESTHETICS OF SUSTAINABILITY: INCORPORATING PLASTIC RECYCLING INTO ART AND DESIGN EDUCATION

Yao Sidian[1*], Rusmawati Ghazali[2], Hou Jinyue[3], Wang Xinyue[4]

[1] College of Creative Art, Universiti Teknologi MARA, Malaysia
Email: 2021410524@student.uitm.edu.my
[2] College of Creative Art, Universiti Teknologi MARA, Malaysia
Email: rusma362@uitm.edu.my
[3] College of Creative Art, Universiti Teknologi MARA, Malaysia
Email: 2022564269@student.uitm.edu.my
[4] College of Creative Art, Universiti Teknologi MARA, Malaysia
Email: 2022950443@student.uitm.edu.my
[*] Corresponding Author

Article Info:

Article history:
Received date: 14.02.2024
Revised date: 13.03.2024
Accepted date: 30.04.2024
Published date: 20.06.2024

To cite this document:

Yao, S., Ghazalim R., Hou, J., & Wang, X. (2024). The Aesthetics Of Sustainability: Incorporating Plastic Recycling Into Art And Design Education. *International Journal of Modern Education, 6* (21), 01-18.

DOI: 10.35631/IJMOE.621001

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Abstract:

This study investigates the integration of environmental conservation principles in university craft and artistry design courses, focusing on the use of recycled plastic bottles. It examines how this innovative approach effectively incorporates environmental concepts into art education, enhancing student creativity and environmental awareness. Through observational methods, the study explores student behaviours in material selection, design processes, and the application of recycled materials, revealing a preference for using beverage plastic bottles for their accessibility and malleability. The study also highlights the role of art in promoting environmental consciousness. It suggests that such practices not only enhance technical and creative skills but also foster environmental responsibility among future designers. This research underscores the necessity of multidisciplinary approaches in art and design education, advocating for experiential learning methods and the use of digital platforms for resource sharing and creative expression. The study contributes to the discourse on sustainable design education, emphasizing the importance of nurturing environmentally responsible designers to address global environmental challenges.

Keywords:

University Design Program, Sustainable Design, Plastic Recycling, Applied Art

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IJMOE
EISSN: 2637-0905
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Introduction

In the contemporary global landscape, plastic pollution represents a critical environmental challenge with persistent and profound repercussions. The United Nations Environment Programme (UNEP) reports that the world generates over 300 million tons of plastic waste annually, yet a mere 9% undergoes recycling processes. Alarmingly, approximately 12% is subjected to incineration, and a staggering 79% accumulates in landfills or disperses into the natural environment(UNEP, 2022), including the vast expanses of our oceans. This relentless deposition of plastic waste exerts an immense strain on ecosystems, with the escalating deluge of plastic debris into marine environments catalysing a severe and growing crisis of oceanic plastic pollution. It is estimated that every year, 11 million tons of plastic waste enter our oceans, posing a grave threat to marine ecosystems and biodiversity(UNEP, 2022). These statistics bring to light an undeniable reality: plastic pollution is not solely an environmental concern but also a profound social and economic issue. Given the slow degradation process of plastics, their persistence in the environment can span hundreds of years(forum, 2018). implying that the plastic waste we generate today will impact the living conditions of future generations. Therefore, the management and recycling of plastic waste become critical. Addressing this challenge requires not only policy development and technological innovation but also the widespread participation of the public and an enhancement of environmental consciousness. This necessity underscores the urgency for comprehensive strategies to mitigate the enduring footprint of plastic waste.

As one of the leading plastic producers and consumers globally, China is facing acute challenges with plastic pollution. Statistically, the country generates an enormous volume of plastic waste annually, a substantial portion of which remains untreated and is either discarded or landfilled(Gu, Zhu, & Ali, 2023). Compounding this issue is China's long-standing reliance on single-use plastic products such as bags, packaging materials, and food containers, which frequently end up as common refuse in both urban and rural areas. This situation not only exacerbates waste management challenges but also reflects the broader environmental implications of disposable plastic consumption.

In response to the escalating issue of plastic pollution, a range of measures has been adopted globally to address this challenge. A key step is the reduction of plastic usage. Moreover, advocating for the use of biodegradable or eco-friendly materials as substitutes for traditional plastics serves as an effective approach to mitigate plastic pollution(Choudhury, Haloi, Bharadwaj, Rajkhowa, & Sarma, 2022). Additionally, enhancing public education and raising environmental awareness are crucial in encouraging individuals and communities to reduce the generation of plastic waste(Tangwanichagapong, Nitivattananon, Mohanty, & Visvanathan, 2017). In terms of managing existing plastic waste, recycling is an extremely effective method(Huang et al., 2022). However, the recycling process faces several significant challenges, including the degradation of plastic quality with each recycling cycle, the complexity of separating plastic types for effective recycling, and the economic viability of recycling processes compared to the production of new plastics. These issues underscore the necessity for innovative approaches to improve the efficiency and sustainability of plastic recycling. Recycling and reusing plastics not only reduce the demand for new raw materials and alleviate environmental burdens but also conserve energy and decrease greenhouse gas emissions(Hopewell, Dvorak, & Kosior, 2009). Although addressing the issue of plastic pollution requires multifaceted measures, recycling plastics is undoubtedly a critical

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DOI: 10.35631/IJMOE.621001

component. It not only aids in reducing plastic waste in the environment but also plays a significant role in promoting a circular economy and achieving sustainable development.

In contemporary university education, the integration of recycled materials into course design has become an increasingly popular practice(Sterling, 2010). Particularly in courses related to art, design, and environmental science, the use of recycled plastics and other materials not only demonstrates innovation but also underscores the necessity of education in this area. This approach facilitates students' direct understanding of the concept of recycling, while encouraging them to explore how waste materials can be transformed into valuable new products. For instance, in craft art or product design courses, students can create models or artworks using recycled plastics, which not only stimulates their creativity but also educates them about the importance of resource utilization. The innovation in incorporating recycled plastics into classroom teaching is reflected in its provision of a multidisciplinary learning platform(Blatti et al., 2019). Students acquire design and artistic skills, as well as fundamental knowledge in environmental science and sustainable development. This interdisciplinary approach aids in developing comprehensive thinking in students, encouraging them to adopt more holistic and innovative methods in problem-solving. Furthermore, the use of recycled materials, especially plastics, plays a significant role in enhancing students' environmental awareness(Hammami et al., 2017). Through hands-on experience in the process and potential of plastic recycling, students gain a more profound understanding of the urgency of environmental protection and their responsibility in fostering sustainable development. This educational approach is instrumental in nurturing future innovators and environmental advocates, equipping them with the necessary knowledge and skills to address global environmental challenges.

This article aims to delve into the practice of using recycled plastic bottles in university craft and art design courses, analysing how this innovative teaching approach effectively integrates environmental concepts into art education. By examining specific case studies of recycled plastic bottles' application, this study not only reveals the feasibility of incorporating environmental protection principles into artistic creation but also demonstrates the potential impact of this method in enhancing student creativity and environmental awareness. Furthermore, the paper will explore the current challenges associated with recycling plastics into new products, such as technological limitations, economic factors, and consumer behavior, and how these obstacles can be overcome within the educational setting. The scope of this research encompasses assessing the practical application of recycled materials in art and design education, with the objective of identifying strategies that not only advance creative expression but also promote environmental stewardship among students. The paper further explores how educational practice can foster students' understanding and involvement in sustainable development, thus offering new perspectives and strategies for addressing global environmental challenges. The amalgamation of environmental concepts with art education not only aids in nurturing future artists and designers but also plays a crucial role in inspiring their sense of responsibility and proactivity as environmental protectors.

Literature Review

Combination Of Art And Environmental Protection

The integration of art and environmental protection has always been a critical area of research and has garnered widespread attention in recent years. Artists and designers play an essential

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role in environmental conservation. They harness their artistic skills and creativity to raise awareness of environmental issues and promote sustainable practices. Through their work, they advocate for a green ecosystem and influence society to adopt more environmentally friendly behaviors(Zou, 2022). Art has emerged as a potent tool for elevating public awareness about environmental issues. It has been observed that public art installations, such as light art installations and interactive exhibits, are capable of engaging audiences and heightening their awareness of critical societal issues like carbon neutrality(Chen, Fu, Yang, & Lian, 2023). Art projects combining science, music, poetry and visual arts have been successful in raising awareness of nature conservation initiatives(Edgars Kavals, 2023). Designers are addressing the issue of waste generation through sustainable design practices. They are exploring sustainable production strategies for consumer electronics, reutilizing resources employed in technological manufacturing(Khan, Sabie, & Vyas, 2023). Furthermore, designers are approaching waste management from a collective and ecological perspective, considering the complex processes of waste management in urban areas and proposing design explorations to address the associated challenges(Lindrup, Tholander, Rossitto, Comber, & Jacobsson, 2023). In the fashion industry, designers are implementing zero-waste design principles to minimize waste generation and foster sustainable growth(Kim & Kim, 2023). Visual artists and performance designers advocate for sustainable environments by using waste as a resource for their artworks, such as constructing theatrical sets from plastic debris(Bramston & Maycroft, 2014).

The field of education is also recognizing the importance of integrating environmental concepts into art education, cultivating students' environmental awareness and creative thinking as crucial components of modern education. Environmental consciousness is perceived as a holistic phenomenon, necessitating a proactive attitude towards nature and oneself(Melnyk & Podorozhnyi, 2023). Ison and Bramwell-Lalor (2023) posits that art education can serve as a pedagogical strategy, enhancing understanding, fostering positive attitudes, and encouraging ideal environmental actions within environmental education curriculums.

Existing literature indicates that the integration of art with environmental conservation offers unique avenues and methods for enhancing public environmental consciousness, educating a new generation, and motivating community involvement. These studies highlight the multifaceted role of art in environmental protection movements, encompassing both individual creative expression and collective environmental actions at the societal level.

Table 1: Summary of Literature on Art, Design, and Environmental Conservation

Author(s)	Key Focus	Main Findings
Zou, 2022	Role of artists and designers in environmental conservation	Artists and designers influence society towards environmentally friendly behaviors.
Chen et al., 2023	Public art installations for raising environmental awareness	Engaging public installations can heighten awareness of societal issues like carbon neutrality.

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Edgars Kavals, 2023	Art projects combining various disciplines for nature conservation awareness	Interdisciplinary art projects raise awareness for conservation initiatives.
Khan et al., 2023	Sustainable design practices in consumer electronics	Exploring sustainable production strategies and reutilizing resources in manufacturing.
Lindrup et al., 2023	Design strategies for waste management in urban areas	Addressing waste management through collective and ecological design explorations.
Kim & Kim, 2023	Zero-waste design principles in the fashion industry	Minimizing waste generation and promoting sustainable growth through zero-waste design.
Bramston & Maycroft, 2014	Use of waste as a resource in visual and performance art	Advocating for sustainable environments by repurposing waste into artworks.
Melnyk & Podorozhnyi, 2023	Integrating environmental concepts into art education	Cultivating students' environmental awareness and creative thinking in modern education.
Ison & Bramwell-Lalor, 2023	Art education as a pedagogical strategy in environmental education	Enhancing understanding, fostering positive attitudes, and encouraging environmental actions.

Incorporating Environmental Concepts In University Education

Incorporating Sustainable Development Goals (SDGs) into design education is crucial for fostering students' knowledge, skills, and attitudes towards sustainable development. Design courses play an integral role in preparing students to confront complex environmental and societal challenges, thereby contributing significantly to the achievement of Sustainable Development Goals. In Chow (2021)'s study, it is mentioned that industrial design students are taught to upgrade waste into valuable products. They are instructed to employ design principles to transform "trash" into "treasure," thereby shifting pollution, and are encouraged to conserve energy and protect non-renewable resources through creative design. In the study conducted by Xie, Mauricio Mejia, Coseo, and Cheng (2020), students specializing in landscape architecture collaborated with communities to design park renovation projects, demonstrating how students in design disciplines can engage in environmentally-related practical projects. In the discussion by Savka, Prokopchuk, Navrotnyy, Prusak, and Prusak (2023), the utilization of discarded materials in Ukrainian design education is examined, focusing on how future designers are taught to create eco-friendly designs. Santulli and Rognoli (2020) discusses the use of discarded materials in design courses at two Italian universities, with a particular focus on waste from the food industry. He developed a classification system based on the chemical origin of waste to complement existing categorizations and emphasized the importance of understanding material characteristics, such as color and texture, in the design process.

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Several studies have emphasized the need for deeper integration of the SDGs into the design of curricula, as sustainable development issues are often addressed, but the SDGs are not specifically included(Browne, 2023). Current approaches to design education may have a capacity gap in addressing social, environmental and sustainable design processes(Meth, Brophy, & Thomson, 2023). However, a clear trend observed is that integrating environmental concepts into design education cultivates a profound sense of environmental responsibility and the ability to contribute to a sustainable future among students. A comprehensive analysis of these literatures indicates that through educational intervention, future designers will be better equipped with the necessary knowledge and skills to address environmental challenges creatively and responsibly.

Applications For Plastic Material Recycling

There is an increasing number of studies related to the application of plastic material recycling. Table 1 illustrates the recent studies related to plastic recycling in the relevant literature. Oladele et al. (2023) discusses the utilization of discarded thermoplastic plastics as raw materials for product development and the potential benefits of recycling them. It also mentions the possibilities of using waste polymers for various applications, including the production of marble flooring, roof marbles, roof tiles, hollow blocks, and marbles. Mitaľová, Dupláková, and Mitaľ (2022) highlights that the recycling of plastic waste is a matter of considerable concern. The study discusses the application of recycled plastic materials in the automotive industry, particularly in car interiors and exteriors. Furthermore, it is noted that the use of recycled plastics in the automotive industry can lead to reduced fuel consumption. Ranakoti, Gupta, Mangal, and Rakesh (2023) provides an overview of various types of plastic recycling processes and their associated applications, underscoring the necessity of recycling to mitigate environmental consequences. The diverse applications of recycled plastic materials include textiles, furniture, road construction materials, automotive parts, and multilayer packaging. Frajová and Opálková Šišková (2022) analyses the potential of fabricating unique textile patterns, interior accessories, and jewelry using recycled plastic materials, specifically polyethylene (PET) from post-consumer used bottles, through electrospinning technology. Chena, Zhengb, Zhouc, Yangb, and Linb (2022) explores the utilization of plastic waste in sustainable fashion design, proposing a design framework for achieving garment sustainability using waste plastics. This framework involves the analysis and testing of the properties of materials made from recycled plastic waste, including a preliminary experiment designed for comparing and evaluating different waste plastic materials.

Table 2: Different Uses of Plastic Recycling

Raw materials	New application	Emphasize	Author
Thermoplastic	Marble floors, roof marble, roof tiles, hollow blocks and marbles	Environmental pollution caused by polymer packaging and the need for biodegradable alternatives.	(Oladele et al., 2023)
Recycled plastics	Automotive interiors and exteriors	The introduction of plastics in automobiles reduces weight, fuel consumption and improves performance.	(Mitaľová et al., 2022)

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Plastic wastes	Civil works (bricks, cubes, embankments, sidewalk layers, etc.)	Using waste plastics can improve material properties	(Reddy, Vidya, & Sri Mullapudi, 2022)
Recycling of plastic waste in syringes	Reinforced building materials, especially composite concrete	The best composition for reinforced concrete is 5% syringe plastic	(Fahim et al., 2023)
Waste plastic film (WPF)	Urban infrastructure and construction materials	Waste plastic film (WPF) can be used for road infrastructure and building materials.	(Ki, Kang, Ma, & Oh, 2021)
Recycling of plastic waste	Building materials, interior elements and furniture fittings	Plastic waste can be transformed into sustainable indoor products.	(Marsahala, Nediari, & Roesli, 2023)
Polyethylene (PET)	Textile patterns, interior accessories and jewelry	Advanced technologies can be used to make new products from recycled plastics.	(Frajová & Opálková Šišková, 2022)
Plastic wastes	Fashion design	Fashion companies are exploring the use of plastic waste in clothing design.	(Chena et al., 2022)
Thermoplastics (HDPE)	Furniture Designs	Thermoplastics (HDPE) as recycled material can be used for sustainable living.	(Sofiana, Wulandari, & Indahyani, 2022)

Current literature suggests that environmental protection has become an integral part of the design and art fields. Many scholars have emphasised the importance of incorporating environmentally friendly concepts into modern design practice, and a plethora of cross-industry examples of attempts to employ environmentally friendly materials have emerged. However, the application of recycled plastics has been primarily focused on the fields of architecture and industrial design, with relatively few student engagement programmes targeting plastic recycling in university educational settings. This phenomenon may stem from the fact that the complexity of the plastic recycling process and the specialised equipment required are beyond the physical conditions and resources of most schools. In light of this, there is a need to explore and develop more low-threshold plastic recycling programmes suitable for college classrooms. Such programmes can directly engage students in environmental practices, which not only enhances their understanding of the importance of environmental protection but also lays the foundation for developing socially and environmentally responsible designers in the future. To achieve this goal, schools need to consider innovative teaching methods and workshop models that make plastic recycling simple, easy for students to do, and educational. Through such educational practices, students can experience the practical application of environmental concepts in the design process, laying a solid theoretical and practical foundation for adopting sustainable strategies in their future work. Therefore, the development of plastic recycling programmes in the university classroom should not only focus on the practical feasibility of the programme but also on its long-term impact on the development of students' environmental awareness and innovative design thinking.

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Methodology

To gain a deeper understanding of the actual integration of environmental conservation principles within university design classrooms and their impact on student behavior, this research adopts the observational method as the primary research approach. Observational method is a qualitative research technique that allows researchers to collect data by systematically observing and recording the behaviors of participants in their natural environment, thereby providing a profound insight into the observed phenomena(Baker, 2006). The strength of this approach lies in its ability to offer real-time and continuous observations of student interactions, engagement, and responses, aspects that may be overlooked or inadequately captured in self-reports or questionnaires(Cotton, Stokes, & Cotton, 2010). Through observation, it becomes possible to meticulously document students' choices, utilization, and handling of environmentally friendly materials, as well as their innovative approaches and technical applications in the creative process. The application of the observational method in university design classrooms enables the real-time capture of how students comprehend and implement environmental design principles(Ritchie, Lewis, Nicholls, & Ormston, 2013). In the context of a course in craft and artistry design, observations can encompass students' choices and utilization of recycled materials, their interactions during the creative process, as well as their attitudes and sentiments toward their creations. The merit of this method lies in its capacity to unveil authentic student responses in the realm of design practice, as well as the practical effectiveness of environmental teaching approaches in the instructional setting. Qualitative research is particularly suited for this study as it aims to capture the nuanced behaviors, attitudes, and interactions of students with recycled materials and environmental design processes, which are best understood through detailed, descriptive observation rather than quantification.

The research conducted over the period of September to October 2023, in Chengdu, Sichuan Province, China, specifically focusing on students from the Chengdu Textile College. To employ the observational method, the researcher will immerse themselves in actual design classrooms, assuming the role of a non-participatory observer(Ritchie et al., 2013). The observer will refrain from offering any opinions or comments on the students' creative processes. Instead, the observer's role will entail recording the behaviors of students throughout the entire course, encompassing aspects such as their choices and handling of recycled plastic materials, their problem-solving approaches in design, and their expression of environmental conservation principles in their creative endeavors. The primary data source for this study will be the students of Chengdu Textile College, providing a rich context for observing the integration of environmental principles in design education.

The focus of the observations will revolve around students' creative processes, interactive discussions, and the presentation of their final works. Additionally, the reflections and discussions of students regarding the use of recycled materials, as well as their satisfaction with their creations at the conclusion of the course, will also be documented. or data analysis, this study will employ thematic analysis techniques to interpret the collected observational data, focusing on identifying patterns, themes, and insights related to students' engagement with environmental principles and materials. Thematic analysis is a flexible method that allows for the organization and description of datasets in detail and is well-suited for examining the nuances of qualitative data.

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However, due to the researcher's role as a teacher, there may be certain limitations and challenges associated with the entire observational process, including:

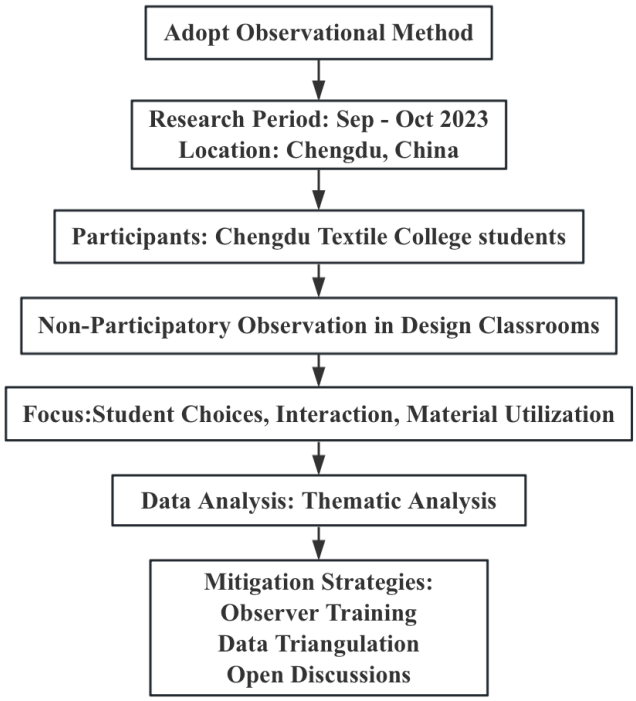
- Subjective Bias: Since the teacher has a direct relationship with the classroom and students, their observations may be influenced by subjective perceptions and pre-existing teaching beliefs.
- Role Conflict: Holding dual roles as both a teacher and observer can lead to conflicts, such as the need to balance classroom management with recording observational data.
- Changes in Student Behavior: Students may alter their natural behavior because they are aware of being observed by their teacher.

To mitigate potential biases and influences resulting from the teacher's role as an observer, the following measures can be implemented:

- Training and Awareness: Provide observer training to teachers, educating them on how to conduct objective, unbiased observations and raising awareness of how their own viewpoints and biases may impact observation outcomes(Muijs, 2006).
- Triangulation: Combine multiple sources of data, such as student feedback, course artifacts, peer observations, etc., to enhance the credibility and validity of the research.
- Open Discussions: Engage in open discussions with students to make them aware of the purpose and significance of the observations, thus minimizing the impact of observations on their behavior.

By implementing these strategies, teachers as observers can more effectively record and analyze data while maintaining the objectivity and accuracy of the research.

Table 3: Research Methodology Flowchart



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Results

During the observational process in this course, we employed a systematic recording approach to ensure the accuracy and comprehensiveness of the collected data. The observations commenced at the outset of the course and continued until its conclusion to capture the entire evolution of student behaviors and attitudes. In each classroom observation session, this research focused on student behaviors in material selection, design formulation, execution of the production process, and team collaboration. By utilizing standardized record sheets and real-time notes, we documented students' rationales for choosing different materials, innovative attempts in their designs, challenges encountered, and how they addressed these challenges.

Post-class student self-reflections and group discussions were also taken into consideration, providing valuable insights into students' internal thoughts and sentiments. Throughout the entire observational process, efforts were made to maintain the continuity and consistency of observations, ensuring the accurate capture of subtle changes and significant trends in the learning process. Through this comprehensive observational and recording methodology, we were able to gain an in-depth understanding of student behavioural patterns and learning dynamics within the context of sustainable design education. Over the course of the entire instructional period, four design cases were ultimately presented. They are presented as follows:

Case 1

Student's name: Fang Ping

Selected material: Recycled beverage bottles

Composition: PET, Polyethylene Terephthalate

Production Method: Cutting, Heat Shrinking, Shaping, Pasting

Product: Hairpin

Figure 1: Recycled Plastic Bottles

Figure 2: Hairpin

Case 2

Student's name: Gao Yan

Selected material: Recycled mineral water bottles

Composition: PET

Production method: Cutting, heat-shrinking, shaping, colouring, gluing

Product: Flower Ornament

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IJMOE
EISSN: 2637-0905
Volume 6 Issue 21 (June 2024) PP. 01-18
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Figure 3: Production Process

Figure 4: Heat Shrink Plastic Sheet

Figure 5: Coloration

Figure 6: Flower Ornament

Case 3

Student's name: Li Xinzhi
Selected material: Recycled beverage bottles
Composition: PET
Production method: Cutting, heat-shrinking, molding, pasting
Product: Flower ornament

Figure 7: Recycled Plastic Bottles

Figure 8: Flower Ornament

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Case 4

Student's name: Luo Fanwen

Selected material: Recycled beverage bottles

Composition: PET

Production method: Cutting, heat-shrinking, molding, gluing, embellishing

Product: Flower ornament

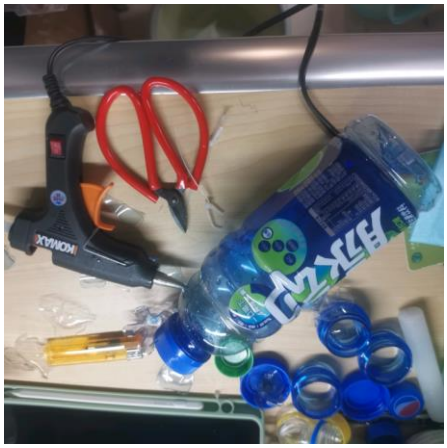

Figure 9: Recycled Plastic Bottles

Figure 10: Flower Ornament

Due to the selection of materials mentioned above being primarily based on post-consumer recycled plastic bottles (PET, Polyethylene Terephthalate), observations have revealed that most students follow a relatively similar production process, which primarily includes the following steps:

- Collection and Cleaning: Firstly, students collect post-consumer plastic bottles, removing bottle caps and labels, and thoroughly cleaning the bottles to ensure there is no residue of beverages or adhesive materials.
- Cutting: They use scissors to cut the plastic bottles open and create petal-shaped pieces according to their design requirements. For the central part of the flower, the bottle base is retained and cut into smaller petals.
- Shaping: The pre-cut plastic pieces are heated for shaping. A heat gun is used, followed by manual shaping of the petals' curved forms.
- Assembly: Once the petal shapes are set, students secure them together to form a complete flower. This process typically involves the use of hot glue or sewing.
- Decoration: To enhance the decorative effect, students add beads or other embellishments to the center of the flower to mimic the stamen or enhance visual appeal.
- Attachment: Finally, the completed flowers are attached to the desired object for finishing the creation.

The observed production process utilized by students working with post-consumer recycled plastic bottles (PET) involves a cohesive series of steps starting from the collection and thorough cleaning of used plastic bottles to ensure they are free from residues. Students then proceed to cut these bottles into petal-shaped pieces tailored to their specific design needs,

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occasionally keeping the bottle base for the central part of the flower. Following cutting, the plastic pieces are heated and manually shaped into curved petals. The assembly phase sees these petals being joined, typically through sewing or using hot glue, to form a complete flower. Decorative elements such as beads are added for aesthetic enhancement, and the final step involves attaching the finished flowers to a desired object, culminating in the creation of environmentally friendly decorative items.

Discussion

In the discussion section of this study, we have synthesized the observational findings and analysis to reveal patterns of behavior among students when engaging in craft and artistry design using recycled plastic bottles, as well as the impact of these patterns on education and environmental awareness. It is divided into the following five parts:

Table 4: Five Findings Of The Study

Aspect	Findings
Material Selection	Preference for using beverage plastic bottles due to accessibility and malleability, demonstrating recognition of recycled materials' potential.
Creative Forms	Predominance of petal or flower artistic pieces, reflecting a connection with nature and a desire for environmental beautification.
Learning Resources	Extensive use of social media instructional videos, highlighting self-directed learning and the reinforcement of technical skills.
Presentation of Works	Finished products are often displayed at home or shared on social media, showing personal pride and spreading environmental awareness.
Satisfaction	High levels of student satisfaction with final products, indicating the effectiveness of integrating environmental principles with artistic expression.

Material Selection:

Firstly, students displayed a preference for using beverage plastic bottles as their primary material. This phenomenon may reflect the accessibility of such materials and their malleability during processing. Since beverage bottles are suitable for cutting, heating, and shaping processes, students can easily transform waste into artistic creations using these techniques. This choice of material and processing method not only signifies students' recognition of the potential of recycled materials but also demonstrates their technical prowess in realizing creative ideas.

Creative Forms:

Furthermore, students predominantly crafted artistic pieces in the form of petals or flowers, which may be related to the widespread allure and symbolism of flowers in the natural world. The selection of this creative form suggests an emulation of nature while possibly reflecting

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Volume 6 Issue 21 (June 2024) PP. 01-18
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students' desire for environmental beautification. Through such artistic creations, students establish a connection with nature both in the physical act of creation and on a spiritual level, thereby deepening their awareness of the importance of environmental conservation.

Learning Resources:

In addition, students extensively referred to instructional videos on social media platforms during their creative process. This behavior highlights the value of self-directed learning in modern educational environments. Utilizing online resources for learning not only enhances students' autonomy but also encourages them to explore and apply new techniques in their creative process. Social media serves as a significant source of information in this regard, reinforcing students' technical skills and innovative thinking.

Presentation of Works:

Students generally tended to bring their finished products back to their homes or dormitories for display and sharing on social media. This behavior not only reflects personal pride and identification with their individual creations but also signifies the perception of personal creations as a form of social currency. This pattern of behavior contributes to the dissemination of environmental and sustainable ideas within a wider social network and may inspire others to engage in similar environmental initiatives.

Satisfaction:

Lastly, the overall satisfaction expressed by students regarding their final products indicates that this instructional model, which combines environmental principles with artistic expression, is effective. Student satisfaction arises not only from their technical proficiency and creative expression during the crafting process but also from the intrinsic sense of fulfilment derived from participating in environmental actions. This sense of satisfaction may enhance their motivation to adopt sustainable lifestyles in the future.

In conclusion, by incorporating recycled plastic bottles into craft and artistry design education, not only do students' technical and creative abilities flourish, but their environmental awareness is also strengthened. Furthermore, this practice encourages students to share their creations through social media, thus promoting environmental information on a broader scale. Therefore, we can conclude that the integration of environmental principles into arts education not only enhances students' practical skills but also cultivates values of sustainable development within them.

Conclusion

This study delved into the implementation process of incorporating environmental conservation principles in the university craft and artistry design classroom and its impact on student behavior using observational methods. The results indicated that students exhibited a preference for utilizing beverage plastic bottles as readily available and manipulable materials, transforming them into art pieces through techniques such as cutting, heating, and shaping, with a particular inclination towards crafting petal and flower forms. This behavior reflects students' pursuit of natural beauty and their identification with environmental conservation. Additionally, students extensively leveraged social media as a learning resource during the creative process, showcasing trends in self-directed learning and technical application. The practice of displaying works at home or in dormitories and sharing them on social media strengthened the social value of individual creations and contributed to the dissemination of

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International Journal of Modern Education
IJMOE
EISSN: 2637-0905
Volume 6 Issue 21 (June 2024) PP. 01-18
DOI: 10.35631/IJMOE.621001

environmental ideals. Students expressed overall satisfaction with their finished products, signifying not only the effectiveness of the instructional model but also a potential boost in their willingness to adopt sustainable lifestyles in the future.

This study has successfully met its research objectives by thoroughly examining and documenting the process and outcomes of integrating environmental conservation principles into craft and artistry design education. Despite providing positive evidence for the integration of environmental principles into art and design education, this study has certain limitations. The application of observational methods may be susceptible to observer bias, and the research primarily focuses on a specific classroom environment, which may not be fully representative of other educational contexts. Additionally, student behavior and satisfaction could be influenced by classroom dynamics and individual interests, factors that should be considered in future research.

The contribution of this study lies in its detailed exploration of how environmental principles can be effectively integrated into design education, offering practical insights and demonstrating the positive impact on student engagement, creativity, and environmental awareness. This study offers valuable insights for future education, emphasizing the necessity of integrating environmental conservation principles into art and design education. It serves as an inspiration for future research by highlighting the importance of hands-on learning experiences, the potential of social media as an educational resource, and the value of promoting sustainable practices through creative expression.

To enhance the quality of instruction and cultivate environmental awareness among students, it is recommended that future curriculum designs incorporate experiential and hands-on learning methods and make full use of digital platforms as tools for resource sharing and creative expression. Prospects for future research should include interdisciplinary approaches to further explore the application of environmental principles in design education, as well as the development of sustainable design projects suitable for different educational environments and resource constraints. Through these efforts, we can lay a solid foundation for nurturing future designers with a sense of environmental responsibility and innovation.

Acknowledgement
The authors would like to encompass sincere appreciation to the anonymous referees of this journal for their helpful suggestions in improving this article quality. The author also sincerely thanks the students from Chengdu Textile College and Arts and Crafts Design major for their contribution and serious cooperation to the paper.

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International Journal of Modern Education
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EISSN: 2637-0905
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