Design of seed paper coaster for sustainable engineering and environmental education in kaxabu niumian community

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Abstract. The consumption of natural resources in the world is increasing. People consume a lot of energy in daily products, such as air and water, cause soil pollution, consumption of natural resources, and the Kaxabu Niumian tribe from a natural pollution-free environment the current excessive development and disintegration of agricultural waste materials. Therefore, it is necessary to understand and promote the entire educational process of new environmental protection technologies. Through the learning of school science and technology education, everyone can inspire ideas, starting from the community and school's environmental education, making products that do not harm the environment, and continue to operate the environmental technology market through technology to improve the living environment. The material used in this product's design is made of natural bamboo or environmentally friendly PVA material shared in the community, so there is almost no burden on the environment. The principle of use will be made through diversified geometric shapes and high-pressure forming of customized shapes. Starting from elementary school education, the primary school students collect water drops on the coaster to become a small potted plant. The water resources are recycled, and the coaster has new functions. This product design principle is taught as a whole set of environmental protection and sustainable engineering methods. The ultimate goal of this research is to integrate technology into education to understand the use of environmentally friendly materials in life, achieve innovative and sustainable energy technologies, and promote environmental awareness.

1. Introduction

1.1. Research Background and Motivation
Nowadays, water is the most critical resource on the planet, but it is rapidly drying up. Scholars predict that two-thirds of the world’s population will face water shortages in the next ten years. Climate change and pollution have made usable clean water resources more and more precious, to reduce the negative impact on the environment, society, and economy [1]. This study conducted two years of children’s creativity education in Zhongxiao Elementary School of the Kaxabu Niumian tribe. In the community, the destructive power of human beings in the natural environment. The waste materials from agricultural operations polluted the environment, and the ground was sustainable. The issue cannot be delayed. We must start from elementary school education and grasp the principles of nature conservation: sustainable use of resources, preservation of species, and ecological system and function maintenance. Therefore, individuals can think about their own behaviors and habits and avoid wasting resources, such as energy-saving, resource recovery, etc. [2]. With this thinking direction, we hope to design a product that can effectively recycle water resources, with the concept of texture, environmental protection, and sustainability. As a whole set of teaching methods for education promotion and environmental protection, starting from science education, let everyone recognize the integration of more environmentally friendly materials and educate them in the lives of the next generation, and allow students think and understand how to integrate technology transactions into environmental protection actions [3].

1.2. Research Purposes
Bringing environmental protection knowledge application education into the concept of sustainability by using the imagination to design this product-seed coaster. The wasted water can be used forever and cultivate new life. The materials are continuously recycled. It has the meaning of science and technology education. The market elements' innovation makes Produce products that are most suitable for establishing environmental protection knowledge from elementary school education and innovative materials and technologies to achieve sustainable development through the different materials, usage, and diversified modeling development. The purpose of this research is the following two points:
(1) Promotion and application of sustainable environmental protection materials in science and technology education
(2) Design innovation and technical research on coasters and potted products, and apply them to sustainable education issues at the elementary and elementary level.

2. Literature Review

2.1. Collection and analysis of existing environmental protection products
This section mainly discusses the concept and research of bringing environmental protection into products made of environmentally friendly materials, using innovative materials and technology to design products, and then researching them into sustainable and multi-change related concepts. Projector paper and plastic packaging (such as Figure 1, Figure 2):
The appearance is simple and has a sense of design, and it is light and convenient to store and use. The advantages and disadvantages are as follows.
A. Advantages: reduced packaging, easy recycling, simple structure.
B. Disadvantages: small capacity, unable to put too much food waste.
2.2. Analysis of materials used in environmentally friendly products

Through the above analysis of cases of environmentally friendly products sold on the market, it is found that different product designs and packaging designs also have other materials used but all need to meet the standards of "materials for sustainable environmental maintenance" and "no additional waste materials" [4].

Different product types have other impacts on the environment. Under ideal conditions, designers should consider the environmental effects of each stage when making decisions in the design process, including the following thinking stages:

1. Production stage:
   Designers can reduce the environmental impact to a minimum by improving product functions, using better technology, choosing appropriate materials, and surface treatments.

2. Transport stage:
   Designers can reduce product weight, reduce product volume, and choose to use the least harmful materials and packaging materials.

3. Use stage:
   The energy consumption of products on the market in the multi-use location is much greater than that in the manufacturing stage, and the use of products thrown away after use will cause a rapid increase in the amount of waste.

4. Regeneration stage:
   Some products are difficult to maintain or dismantle, and therefore cannot be reused. Therefore, designers can avoid unnecessary environmental damage by designing parts that extend the product's life, emphasizing the acquisition, use, and recycling of resources, and then follow the ideal procedure Return to nature. Its thinking mode is extended by a single circular concept.

   In short, the primary purpose of green design is to comprehensively reduce environmental impacts, from product planning to production, use, and recycling, and to communicate with other related systems, such as marketing, materials, institutions, education... The primary considerations are function, reliability, Usability, appearance, and cost [5]. Waiting for the collocation with different fields can achieve a sustainable production goal.

2.3. Analysis of making coasters and potted materials on the market

2.3.1. Coasters

The purpose of the existing coasters is to avoid the condensation of small water droplets on the paper or desktop caused by the contact between the cold drink's outer wall and the air. Besides, it is non-slip, strengthens the cup's stability, and is not easy to slide. The standard coasters are made of silicone, Paper, cork, wood, ceramics, and each material has its advantages and disadvantages.

1. Ceramics
   As the choice of coaster material, it has an elegant texture. The advantages and disadvantages are as follows.
   A. Advantages: strong water absorption, reusable.
   B. Disadvantages: intolerant of falling, intolerant of impact.
2. Bamboo
It has the characteristics of environmental protection and rapid growth. As the most economical innovative material, its advantages, and disadvantages are as follows.
A. Advantages: good drainage, good air permeability, reusable.
B. Disadvantages: easy to mold, need special treatment.

3. PVA (polyvinyl alcohol):
Under certain conditions, it can be dissolved in water without any pollution. The advantages and disadvantages are as follows.
A. Advantages: good air permeability, reusable.
B. Disadvantages: dissolution conditions require special treatment.

2.3.2. Potted plants
There is usually little difference in the production of potting materials. Under normal circumstances, the service life is quite long. Except for ceramics, tile pots, etc., because the materials are fragile, more attention should be paid to handling. However, various materials have their advantages and disadvantages, and you can choose according to your needs. For potted plants with suitable materials, the most basic attention should be paid to the amount of water to be irrigated to prevent the plants from being soaked in excessively wet soil for a long time and causing the plants to rot.

The following are the common materials of potted plants:
1. Pot
   A. Advantages: low price, good air permeability.
   B. Disadvantages: easy to a brittle, rough texture.
2. Plastic basin
   A. Advantages: cheap, lightweight, not easy to break.
   B. Disadvantages: low price, poor air permeability, poor water permeability.

3. Research methods
This article attempts to highlight the following issues:
1. Analysis of the production method of environmentally friendly product materials.
2. Coaster function application design combined with potted plant design research.
3. Sustainable operation, promote environmental awareness through education, and improve the living environment.

   This research method is divided into two parts: In the first part, the product shape, color matching, and material methods of coasters and potted plants can be used to better understand the texture and value of coaster and potted works. The second part is to collect and analyze the process of making coasters and potted plants. The research and production projects include four categories: "environmentally friendly materials. The research method will take the literature reference and the design of environmentally friendly products. In the literature research, collect information about the difference between the materials used in most products on the market and the environmental protection materials, the stage considerations of sustainable use, and apply them to the design of products to understand the meaning of product modeling. The system of home environmentally friendly seed coasters is used as a complete set of educational process models—the product concept of environmental education [6].

4. Research Analysis
Through the above research, the following points can be sorted out:
Analysis of problems in coasters and potted plants.
According to product data analysis, the current problems of existing products are as follows:
(1) It is challenging to balance appearance and function.
(2) The product cannot be used continuously after use.
(3) Most of the product materials are non-environmentally friendly materials.
(4) Low product selectivity.

The design policy is set:
1. The appearance design is simple and has changeable and multi-combination methods, which can provide consumers with more options.
2. The production material uses natural environmental protection materials, which can be decomposed with nature without adding additional burden.
3. Use the concept of recycling without wasting any resources.
4. Combine the functions of the two products to increase product value to achieve innovation and sustainability.

5. Conclusion
The designs aim to shape the coaster based on the simple geometric shape to suit the plant shape. The continuous arrangement and combination of many aspects can increase the use area, as shown in Figure 3. The changeable form allows consumers to have more changes according to their personal preferences. More choices and variability increase different possibilities. After many considerations, the seed coaster seeds are selected to grow slowly, suitable for indoor growth, and regulate indoor air quality. The local plants such as paniculata, lour, dietr, comosum, etc., as shown in Figure 4.

The results of this research are applied to the primary environmental education of Zhongxiao Elementary School of the Kaxabu Niuman Tribe. After two years of children’s creativity education, the researchers realized the destructive power of human beings to the natural environment and the waste of agricultural operations. Materials pollute the ground, and environmental sustainability is essential by understanding and promoting the local educational system by using new environmental protection technologies. Adapting to the school, the learning of science and technology education will allow everyone to stimulate ideas from the community and school environment. Since the beginning of science and technology education, self-made products that do not harm the environment can improve the living environment through the community's sustainable operation.

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