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Exploration of Creativity Through Project-Based Learning in Eco-Printing Using the Pounding Technique for Students at Kalanganyar Public Elementary School Sidoarjo

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Abstract: *Exploration to develop elementary school students' creativity through the application of Project-Based Learning (PBL) with pounding-based Ecoprint techniques at Kalanganyar State Elementary School, Sidoarjo. The Ecoprint program at Kalanganyar Elementary School is an initiative that involves college students teaching grade 7 to develop children's creativity. Ecoprint activities involve a process of creating environmentally friendly batik fabric that emphasizes sustainability principles. In this activity, leaves, flowers, or other organic materials are used as natural motifs on batik fabric by pressing them directly onto the fabric surface. In this program, students in grades 4, 5, and 6 at Kalanganyar Elementary School are invited to explore the beauty of nature through Ecoprinting using the pounding technique, which utilizes natural materials to print environmentally friendly artworks. In this process, children not only learn about printing techniques but also important values such as environmental sustainability, respect for nature, and responsibility towards the environment. They are given the opportunity to develop their creativity by creating designs inspired by their surroundings. The program employs an approach that includes problem identification, preparation, coordination with parents and the community, activity socialization, program inauguration, and implementation. Through this activity, it is hoped that children can broaden their understanding of the importance of preserving the environment from an early age and develop critical and creative attitudes in addressing ecological challenges in the future. Additionally, the Ecoprint program also provides opportunities for children to collaborate, receive additional training, and build positive relationships with the surrounding community. This is expected to help them grow into caring, independent young people who make positive contributions to sustaining our environment.*

1. BACKGROUND

Education at the elementary school level plays a crucial role in forming the foundation of students' skills and character. One of the primary goals of elementary education is to develop students' creative potential, enabling them to think critically, innovate, and find solutions to future challenges. One effective way to achieve this is by using innovative and engaging

learning approaches, such as Project-Based Learning (PBL). Project-Based Learning focuses on providing students with opportunities to work on real-world projects that require collaborative skills, problem-solving, and research. In this context, Project-Based Learning can be utilized to foster student creativity through activities involving direct interaction with natural materials and artistic techniques that enhance their imagination. One suitable activity for this approach is Ecoprint, a form of print art using natural materials, combining artistic creativity with an understanding of the surrounding environment.

Ecoprint with the pounding technique is a method of creating natural prints by pressing leaves or flowers to transfer colors and shapes onto fabric or paper. This technique not only teaches students artistic skills but also introduces them to the importance of environmental preservation and sustainability. By using materials readily available from their surroundings, such as leaves and flowers, students can better understand the relationship between art and nature and learn to use natural resources responsibly.

With the growing awareness of environmental protection, education on environmental sustainability and ecology has become a main focus in educational curricula worldwide (Rheizkhira Reflin et al., 2023). Environmental education from an early age is crucial for shaping a mindset and behavior that cares about nature (Lubis, 2023). One practical implementation of environmental education is through Ecoprint activities introduced in elementary schools. Elementary schools are a strategic educational setting for shaping children's character, including their awareness of environmental conservation. Ecoprint activities in elementary schools are not only creative art activities but also an effective means of educating children about the use of eco-friendly materials and responsible printing techniques for ecosystems (Attoriq, 2022).

Ecoprint is an environmentally friendly batik-making process that prioritizes sustainability principles. In this activity, leaves, flowers, or other organic materials are used as natural motifs on batik fabrics by pressing them directly onto the fabric surface (Wardani et al., 2024). The main objective of Ecoprint activities in elementary schools is to teach children the importance of recycling and using natural or recycled materials in their everyday creative art practices (Suharsono et al., 2022). By using materials like recycled paper, leaves, or other organic items, Ecoprint not only reduces the negative environmental impact through the use of recycled resources but also introduces children to essential concepts such as material cycles and environmental responsibility (Mardiana et al., 2020).

In addition to environmental education, Ecoprint activities also significantly benefit children's creativity and fine motor skills development. Through the process of printing with natural materials, children can expand their imagination and hone their technical skills to create unique and varied artworks. Furthermore, Ecoprint activities in elementary schools also help build community awareness of environmental protection efforts. By involving students, teachers, and parents in inclusive and collaborative teaching-learning processes, Ecoprint becomes not only a classroom activity but also a platform for broadening the understanding of sustainability to the entire school and surrounding communities (Agus Triyogo & Yulfi, 2022).

The relevance of Ecoprint activities in elementary schools also lies in their contribution to shaping children's character as environmentally conscious future generations. Through direct experience in creating art using eco-friendly materials, children can feel the positive impact they can have in preserving the natural environment around them (Natadjaja et al., 2021). In the context of globalization and the increasingly evident climate change, Ecoprint activities in elementary schools are not only an alternative choice but also a necessity in maintaining the sustainability of life on this planet. By laying a strong educational foundation on sustainability from an early age, we shape a generation capable of proactively and powerfully addressing future environmental challenges (Kurniati et al., 2021).

Efforts to integrate the Ecoprint program in schools have yet to receive serious attention from the government (Anugrah & Novrita, 2023). Many policies and directives do not yet reflect a strong commitment to implementing the Ecoprint program in schools (Indah Lestari et al., 2023). As students from Kampus Mengajar 7, we conducted a survey at Elementary School Negeri Kalanganyar, Sidoarjo Regency, to gain deeper insights into this matter. In this survey, we found several issues, such as inadequate school facilities for Ecoprint activities, possibly due to limited facilities like a lack of dedicated art spaces, insufficient printing tools, or necessary Ecoprint materials, and a lack of support and understanding from the school regarding the importance of eco-friendly activities. Considering these findings, we, the Kampus Mengajar 7 students, are eager to assist in enhancing children’s creativity through Ecoprint activities, targeting students in grades 4, 5, and 6 at Elementary School Kalanganyar.

The primary goal of Ecoprint activities for elementary school children is to teach them about the importance of environmental preservation through eco-friendly artistic practices. Through Ecoprint, children can learn to appreciate nature and understand how to use organic and recycled materials to create beautiful artwork. Additionally, Ecoprint aims to develop children’s creativity by utilizing natural motifs from leaves, flowers, and other organic materials in fabric or batik printing. Thus, Ecoprint activities provide not only an enjoyable

artistic experience but also build environmental awareness from an early age, turning children into agents of change concerned about environmental sustainability. Furthermore, this program successfully strengthens children's self-confidence, teamwork, and social responsibility, helping them become independent, competitive, and positively contributing young people in society.

Support from teachers, internal motivation, and parental support are crucial to the success of the Ecoprint program for elementary school children. Firstly, teacher support is the main key in running this program. Teachers need to understand the concept and benefits of Ecoprint activities and have the skills to teach it to students in an engaging and effective manner. With strong teacher support, children will be more motivated to participate in this program enthusiastically. Additionally, students' internal motivation is also essential. Children need to understand the importance of environmental protection and feel motivated to actively participate in Ecoprint activities. This motivation can be enhanced through a deep understanding of the program's benefits and appreciation of the artwork produced.

Parental support also plays a major role in supporting the Ecoprint program's implementation. Parents need to understand the values and benefits of this activity and provide support and encouragement for their children to participate in it. Parental support can take the form of participation in socialization activities, helping provide Ecoprint materials, and appreciating their children's artwork. Overall, teacher support, students' internal motivation, and parental support are key elements that reinforce and complement each other to ensure the Ecoprint program's success. With strong collaboration among all involved parties, elementary school children can experience meaningful learning and build a strong environmental awareness through eco-friendly art activities.

This service aims to explore how the application of Project-Based Learning through the Ecoprint technique with pounding can enhance students' creativity at Elementary School Kalanganyar, Sidoarjo. Through this activity, it is hoped that students will not only develop their artistic skills and creativity but also gain a deeper understanding of the importance of environmental conservation and work collaboratively in groups. Thus, this activity is expected to contribute positively to the development of students' potential in terms of both artistic skills and character-building that fosters environmental consciousness.

2. METODE

This community service applies a training approach based on the concept proposed by Nasution (1982). This concept views training as a learning process that uses specific techniques and methods to enhance individual skills and work abilities with the aim of increasing productivity. The method used in the Ecoprint community service employs the pounding technique, which is one of the techniques in Ecoprint art used to transfer natural pigments from organic materials, such as leaves, flowers, or bark, onto the fabric surface. This process involves the use of physical pressure to facilitate the transfer of pigments from these organic materials to the fabric.

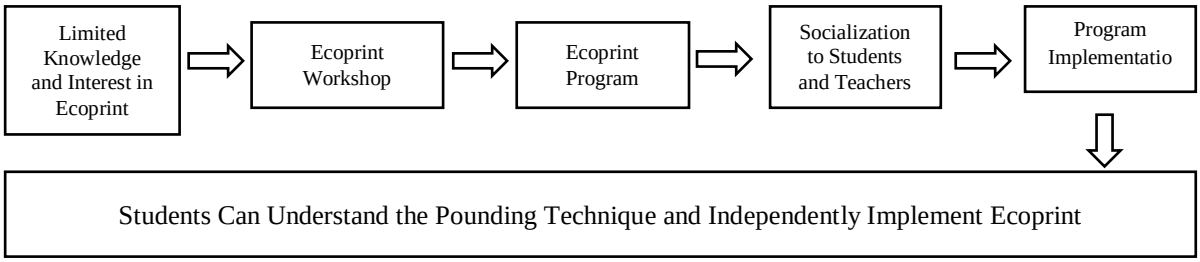

Figure 1. Solution Framework for Problem Solving

The Ecoprint community service activity using the pounding technique was conducted at Kalanganyar State Elementary School, Sedati Subdistrict, Sidoarjo Regency. The target audience for this activity included ten teachers from Kalanganyar State Elementary School, with the hope that they could pass on this skill to their students, as well as selected fourth, fifth, and sixth-grade students. These grade levels were chosen because children at this age are capable of understanding instructions and carrying out the Ecoprint activity. We conducted an Ecoprint training exploration with the pounding technique at Kalanganyar State Elementary School because, according to a survey, the school had never previously engaged in Ecoprint. It is hoped that, after the training, there will be an improvement in students' skills, ultimately enhancing the school's reputation and appeal in the community.

Before implementing the pounding technique in Ecoprint, we noted that there are several techniques to carry out Ecoprint: (1) Pounding (by hammering), (2) Steaming, and (3) Boiling (Hikmad and Retnasari, 2020). The steps for the pounding technique include: (1) preparing fabric as a medium, (2) arranging leaves on the fabric in a specific pattern, (3) covering the fabric and leaves with plastic, (4) hammering the fabric over the leaves so the leaf pigment transfers to the fabric, (5) removing any leaf residue and air-drying the fabric for 12 hours, and (6) soaking the fabric in alum water and drying it again until fully dried. We also provided a brief explanation of Ecoprint to the school principal and the teaching staff, including

information on the supplies students would need, such as specific leaves that can produce color pigments. Additionally, we encouraged teachers to inform fourth, fifth, and sixth graders to bring leaves capable of producing color pigments, while we prepared the necessary tools and materials.

In addition to observing the environment before the training and providing guidance during the Ecoprint activity, we also conducted two practice trials of the pounding technique in Ecoprint to achieve the desired results. Our research activity plan included the following steps: first, we conducted an environmental survey; second, we performed two Ecoprint trials and practices; after the two practice sessions, we held an Ecoprint training for students; and finally, we analyzed the outcomes of the Ecoprint implementation.

In the initial stage of creating Ecoprint, the pounding technique is introduced by first explaining what Ecoprint is, the different types of Ecoprint techniques, the process or steps involved in making Ecoprint, the tools and materials that need to be brought, and showcasing the Ecoprint results from the trial conducted by the instructor. Below are the tools and materials to be used, along with a brief explanation.

1. Fabric

The fabric used for this Ecoprint activity is Mori Primissima grade A. The fabric used for the sixth-grade practical exam is 150cm in size, while for fifth-grade classes A and B, it is 250cm in size.

2. Water

Any clean and clear water can be used for making Ecoprint.

3. Basin

A basin is used to soak the mixture of materials for making Ecoprint.

4. Hammer

A hammer is used to strike the leaves and flowers that will be used in the Ecoprint process, to release the sap or essence from the plants being struck.

5. Leaves and Flowers

In Ecoprint, there are various leaves that can be used. Some examples include Ketapang leaves, castor leaves, starfruit leaves, cassava leaves, papaya leaves, butterfly pea flowers, and kenikir flowers.

6. Alum and Tannin

   These are used to fix the natural colors from the plants onto the Ecoprint fabric.

7. Vinegar

Vinegar is used to enhance the colors of the leaves and can also be used to treat the leaves to ensure that the sap is released maximally

In the initial stage, students and teachers select plant materials to be used, such as leaves with interesting shapes and textures, for example, teak leaves, red shoots, butterfly pea, and papaya, which can produce beautiful patterns on the fabric. The plant materials should be fresh and in good condition to ensure optimal results. Next, the Mori fabric is soaked in a mixture of water and alum (TRO), with a ratio of 3 liters of water to 1.5 tablespoons of alum. The soaking process lasts for a minimum of 12 hours and up to 24 hours, which serves to preserve the fabric and prepare it to accept the color prints from the plants. After 12 hours, the fabric is removed, rinsed thoroughly, and air-dried. This process is called mordanting and aims to prepare the fabric to receive color from natural materials.

The next stage involves preparing the Mori fabric for the Ecoprint process using the pounding technique. A solution mixture consisting of 4 tablespoons of alum, 1 tablespoon of tannin, and 1 tablespoon of vinegar is dissolved in 3 liters of water, stirred, and left to settle until the impurities are removed. After the sediment forms, the clean water is transferred to another container to briefly soak the fabric, ensuring the fabric is evenly damp. The fabric is then sun-dried until it is half-dry. In the design stage, leaves and other plant materials are arranged neatly on the fabric, with either a symmetrical or random pattern, depending on preference. Then, the fabric is tightly rolled and secured with string or ties to ensure all the materials stay in place during the printing process. The rolled fabric is then steamed in a natural dye solution or water for several hours. This process allows the pigments from the plant materials to transfer onto the fabric, creating natural prints. Once completed, the fabric is left to dry, and the ties are removed, revealing the natural prints from the plants. As the final step, the fabric is ironed to set the pigments and extend their durability, ensuring the print patterns remain intact for an extended period.

3. RESULT

The pounding stage in Ecoprint is a technique where natural pigments from plants are transferred to fabric by striking the surface of the fabric that has been arranged with leaves, flowers, or other plant parts. This technique is typically done using a wooden mallet or other heavy tools that can generate sufficient pressure to transfer the natural pigments from the plant

material to the fabric fibers without damaging its texture. During the pounding stage, the fabric, which is slightly damp, is arranged with the plant material on top, then covered with plastic or another protective layer before being struck evenly. The pounding allows the pigments and the natural shapes of the leaves or flowers to be imprinted onto the fabric, creating unique patterns and colors according to the shape and texture of the plant materials. This stage plays a crucial role in Ecoprint because it enables the mechanical transfer of color without the use of chemicals. The result of pounding typically produces natural prints that are varied, reflecting the characteristics of the shapes and colors of the leaves or flowers used.

The initial stage in the Ecoprint process begins with selecting the plant materials to be used, such as leaves, flowers, or other plant parts. For optimal results, the plant materials chosen should be fresh and young, as the natural pigments in the tissues of fresh plants are more active and transfer more easily to the fabric fibers. Young leaves or flowers also have higher water and chlorophyll content, which helps provide clearer and sharper colors and prints on the fabric.

Figure 2. Ecoprint Preparation Process

The next stage in the Ecoprint process involves preparing natural fabrics, such as cotton or linen, which have high absorbency and ideal textures for pigment absorption. Before use, the fabric must be thoroughly cleaned to ensure there are no particles that could obstruct the color transfer. The fabric is soaked in water to soften the fibers, making it more ready to absorb the plant pigments optimally.

Once the fabric is half-dry, the next step is to prepare a plastic sheet the same size as the fabric. This plastic serves as a base to keep the fabric flat during the Ecoprint process. The half-damp fabric is spread over the plastic, and the plant materials (leaves or flowers) are neatly arranged on the wet fabric surface according to the desired design. Afterward, the fabric and plant materials are covered with another plastic layer of the same size to ensure that the position of the materials stays in place during the pounding stage..

Figure 3. Arrangement of Leaves Before Pounding Process

Using a wooden mallet or other heavy objects to apply controlled pressure to the folded surface of the fabric. The pressure should be strong enough to allow the natural pigments from the leaves and plant materials to effectively transfer to the fabric fibers, resulting in clear and stable prints. It is important to maintain a balance between force and gentleness during this process to avoid damaging the fabric or the plant materials being used.

Figure 4. Process of Hammering Leaves onto Mori Fabric

After the pounding process is complete, the fabric is slowly unwrapped, revealing the natural patterns created by the plant pigments that have been transferred to its surface. These pigments come from the pressure applied to the plant materials placed between the fabric layers, allowing the natural dye molecules to seep into the fabric fibers.

Following this stage, natural drying is required to ensure the stability of the pigments before the fabric is ironed. Ironing is done to strengthen and set the pigments on the fabric, making the colors more durable. To maintain the natural dyeing results, the fabric can be gently washed with cold water and soap that does not damage the pigments. This process cleans any plant residue that may remain without diminishing the intensity or durability of the colors that have been created.

Figure 5. Finishing Process

4. DISCUSSION

The Ecoprint process using the pounding technique effectively creates unique, nature-inspired patterns on fabric. Students and teachers successfully learned how to transfer natural pigments from plants to fabric, following the steps from material selection to the final ironing. Key factors for success included choosing fresh, young leaves like teak and butterfly pea, which produced vibrant prints. The mordanting process ensured the pigments adhered well, creating clear and durable prints. The pounding technique, applied with precise pressure, transferred the pigments effectively without damaging the materials. This method produced vibrant, stable prints, emphasizing the use of natural, eco-friendly materials without synthetic dyes. Though requiring patience, the process showcased the environmental benefits of Ecoprint, promoting sustainable art practices.

The activity met its educational goals by fostering creativity and environmental awareness among students and teachers, with positive feedback suggesting that Ecoprint can be a valuable addition to the curriculum. Future projects may explore different materials and techniques to diversify the outcomes.The results of Ecoprint produce unique fiber art works with patterns and colors formed from plant pigments, reflecting the natural interaction between botanical materials and fabric as a medium. Each Ecoprint result has its own uniqueness, influenced by the type of plant, botanical condition, and technique used, resulting in variations in patterns and color intensity. Pigments extracted from leaves, flowers, or other plant parts leave structured imprints on the fabric fibers, giving unique patterns based on the characteristics of each material. The variation in leaf shapes and textures creates rich and visually appealing patterns, while the natural colors of plant pigments add warm and earthy tones to the fabric or other fiber media. The use of natural fabrics like cotton or silk is ideal because their fiber structure supports the absorption of natural pigments, allowing for deep and long-lasting colors.

Ecoprint works also reflect the biodiversity of the surrounding environment, from eucalyptus leaves creating geometric patterns to pomegranate flowers producing striking red hues. This process not only creates fiber art but also connects aesthetic elements with ecological beauty. The results of Ecoprint have wide applications in creative projects, including the creation of clothing fabrics, scarves, wall decorations, and decorative artwork. Each Ecoprint piece becomes a special and unique art object, showcasing the beauty of nature in an enduring form with high artistic value..

Figure 6. Ecoprint Results

5. CONCLUSION

Ecoprint based on the pounding technique, in the context of Project-Based Learning (PBL), serves as an exploration of creativity for the students of Sekolah Dasar Negeri Kalanganyar Sidoarjo. This approach allows students to be directly involved in the creative process using natural materials to create patterns and colors on fiber media. Through PBL, students actively and independently learn at each stage of Ecoprint, from selecting plant materials to the pounding technique that results in natural prints on fabric. In addition to developing artistic skills, this method also encourages students to understand the connection between nature and art, increasing their appreciation for local resources, and stimulating critical and collaborative skills.

Overall, the activity successfully introduced and promoted the pounding technique of Ecoprint to students in grades 4, 5, and 6 at Sekolah Dasar Negeri Kalanganyar. Introducing Ecoprint to elementary students is an effective step in raising awareness about the importance of environmental conservation and supporting the development of creativity based on local potential. Prior to this activity, the students of Elementary School Kalanganyar had no understanding or experience with Ecoprint techniques. Therefore, this activity provided a valuable opportunity to expand their knowledge and skills while maximizing the potential of the surrounding environment by utilizing local plants around the school.

The program also emphasizes the importance of community participation, as evidenced by the support and involvement of the school, teachers, and parents, ensuring that the introduction of Ecoprint was carried out effectively and had a positive impact on the students. It is hoped that this activity will help students better appreciate and preserve the environment while promoting local art and creativity as part of their learning process.

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