

Integrating a Natural Resource Preservation Dance into SDGs-Based Learning to Foster Elementary Students' Understanding of Sustainable Living

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Abstract. The low level of elementary students' understanding of sustainable living remains a challenge in achieving quality education aligned with the Sustainable Development Goals (SDGs). This study aims to develop SDGs-based learning media in the form of a dance performance as an educational tool to enhance students' understanding of sustainable living. This Design and Development (D&D) study, implemented at the Universitas Pendidikan Indonesia, involved three expert validators (a dance expert, an elementary school teacher, and a science literacy expert) and 250 respondents consisting of elementary students, teachers, and pre-service teachers as the subjects of user testing. The developed product is a dance performance themed around natural resource conservation, supported by nature-inspired music, and costumes and props created from recycled materials. Validation results show that the media meets the criteria of relevance, clarity, and suitability for learning sustainable living. Audience responses also indicated positive evaluations of the performance's ability to visualize sustainability principles through movement, rhythm, and expression. These findings demonstrate that integrating dance into SDGs-based learning can serve as an innovative and meaningful approach to strengthening elementary students' understanding of sustainable living.

Keywords: Elementary Student, Learning Media, Dance Education, SDG's.

INTRODUCTION

Awareness of sustainable living in Indonesia is increasing. According to the report from the Ministry of Education and Culture, the implementation of the *Merdeka Curriculum* has encouraged schools to integrate the principles of the Sustainable Development Goals (SDGs) into the learning process (Sogen, 2023). Recent studies show that the values of character education acquired through art activities, including dance, contribute to the preservation of culture and the environment among elementary school students, particularly after the COVID-19 pandemic (Agustin et al., 2022). Through art education, children not only hone their artistic skills but also internalize sustainability values that are essential for present and future life.

However, challenges still exist in building an understanding of sustainable living among elementary school students. Many teachers face difficulties in integrating dance as a medium for effectively conveying SDGs concepts in the classroom (Sari et al., 2021). As a result, students' understanding of sustainability issues such as the preservation of natural resources, environmental conservation, and ecological awareness remains low. This condition can hinder the development of students' commitment to actions that support sustainability, which is crucial for the future of both individuals and their communities (Priantini & Widiastuti, 2021).

Previous studies have generally focused on the development of art curricula or dance learning strategies separately, without specifically addressing the relationship between dance and SDGs education in elementary schools (Giyartini, 2020). Research by Widiastuti and Priantini (2022) shows that contextual approaches in learning design can improve learning outcomes, although they have not yet been directly linked to understanding sustainability. This indicates an important research gap: how dance can be strategically integrated into SDGs-based curricula to deepen elementary students' understanding of sustainable living.

The urgency of this research becomes more apparent as global environmental issues intensify and the need for sustainability-oriented education grows. Elementary schools must teach sustainability values through learning media that are engaging and relevant to children. Integrating dance into SDGs learning not only develops artistic skills but also instills environmental awareness and social values that support sustainable living (Retnawulan et al., 2024). Therefore, this study aims to develop innovative learning media that incorporate dance into the SDGs curriculum to enhance elementary students' understanding of sustainability concepts.

The results of this study are expected to provide a significant contribution to both the theoretical development of arts education and its practical implementation in classrooms. The findings are anticipated to assist educators in designing more innovative and contextual programs for instilling sustainability values through dance. With this interdisciplinary approach, elementary school students are expected to become more active and aware of their roles in supporting global sustainability goals (Lestari, 2017).

METHODOLOGY

This study employed the Design and Development (D&D) method. This approach involves the systematic study of design, development, and evaluation processes to establish an empirical foundation for creating instructional and non-instructional products, tools, and models, as well as refining existing ones (Richey & Klein, 2007). The planning phase included needs analysis conducted through interviews with teachers and document analysis of the elementary curriculum to formulate learning objectives. This phase resulted in the formulation of learning objectives, ideas, and dance art concepts. In the production phase, the researcher transformed dance ideas into a storyline that served as the basis for exploration, improvisation, and movement formation. The dance evaluation was conducted in two stages: expert validation during the production phase and assessment by elementary students, teachers,

and pre-service teachers during the performance to gather feedback on the developed dance-based instructional media. The steps are depicted in Figure 1 below.

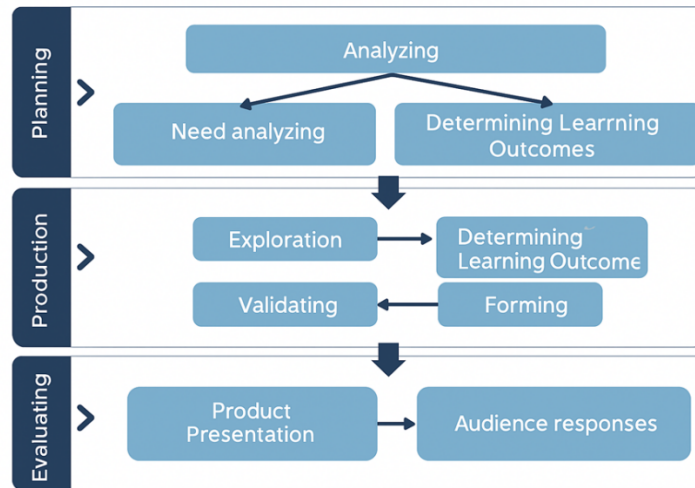


Figure 1. Research Procedures with the PPE Model

The research data consisted of both qualitative and quantitative data. Data were collected through interviews, document analysis, and respondent questionnaires using a purposive sampling technique. Interviews were conducted with dance experts to explore appropriate dance forms for elementary students and with elementary teachers to understand students' knowledge of the SDGs and how teachers introduce these concepts. The quantitative instruments included product validation scores and respondent questionnaire results, while the qualitative instruments comprised interview results and suggestions from the validators.

The participants in this study consisted of three validators: a dance expert, an elementary school teacher, and a science literacy expert. The dance expert was responsible for evaluating the artistic and aesthetic aspects of the developed dance movements. The elementary school teacher was involved due to their deep understanding of effective communication strategies for delivering educational messages to children. Meanwhile, the science literacy expert ensured that the sustainability-related content conveyed through the dance performance was scientifically accurate and contextually relevant. In addition to the validators, 250 audience members including students, teachers, and pre-service elementary teachers also participated as respondents to evaluate the developed instructional media. The research was conducted at the Universitas Pendidikan Indonesia, chosen for its facilities, resources, and academic environment that support educational art activities and regularly host public educational art performances.

RESULTS AND DISCUSSION

Dance Art Development

The development process of SDGs-based dance art began with a needs analysis conducted during the planning phase, following the research model applied. At this stage, the researchers collected and analyzed data related to the needs identified from preliminary observations. The analysis included aspects of learning needs, curriculum, and learning media used in elementary schools. Data were gathered through teacher interviews and document studies to strengthen contextual understanding of the learning process. The interviews aimed to identify how familiar students were with the concept of the SDGs and how teachers introduced these concepts in classroom activities. Additionally, the researchers explored information about students' level of environmental awareness and the strategies teachers employed to foster such awareness.

Table 1. Results of Interviews with Teachers at the Media Design

Indicator	Teacher Answer
SDGs	The teachers reported that they had never specifically introduced the concept of the SDGs to students, either explicitly or by linking it to the learning materials. They also expressed uncertainty regarding whether the students were familiar with or understood the meaning of the SDGs. Furthermore, no instructional innovations incorporating SDGs-related content had previously been implemented in the school.
Learning Media	The teachers explained that the learning media used so far were limited to textbooks and slide presentations. Instructional media incorporating dance elements had never been utilized before, and the teachers had no prior experience in developing learning media in the form of dance art. Moreover, the students had never been invited to watch dance performances that convey SDGs values, either in person or through video recordings.
Students' understanding of sustainable living	The teachers revealed that students in grades 1, 2, and 3 generally lacked an understanding of the concept of sustainable living. However, students in grades 4, 5, and 6 began to

demonstrate a basic awareness of environmental sustainability. This was reflected in their habits of maintaining cleanliness and environmental preservation such as disposing of waste properly, understanding waste classification, participating in classroom cleaning duties, and recognizing the benefits of recycling used materials. These attitudes were primarily shaped through teachers' behavioral modeling and advice rather than through systematically structured learning activities.

The interview results revealed that teachers had never explicitly introduced the concept of the SDGs to students or connected it to the learning materials. Learning innovations that incorporate SDGs-related content had also never been implemented, and the media used in instruction remained limited to textbooks and slide presentations. Neither teachers nor students had ever utilized dance-based learning media related to the SDGs, either directly or through video. Furthermore, students' understanding of sustainable living varied; lower-grade students generally lacked awareness of the concept, while upper-grade students began to exhibit environmentally conscious behaviors, such as disposing of waste properly, maintaining classroom cleanliness, understanding waste classification, and recognizing the benefits of recycling activities. These findings indicate that the development of sustainable living habits was primarily shaped by teachers' modeling and advice rather than through structured instructional activities.

Based on the curriculum analysis, the researchers found that the values and objectives of the SDGs could be integrated into the *Ilmu Pengetahuan Alam dan Sosial* (IPAS) subject at Phase B (grades 3–4) and Phase C (grades 5–6). The materials most aligned with the SDGs include the preservation of natural resources, climate change mitigation, energy conservation, and the utilization of alternative energy sources. Therefore, the researchers selected the topic of natural resource preservation as the foundational idea for developing an SDGs-based dance art project. The dance performance was designed by incorporating visual art elements into recycled costumes and props, combined with orchestral music as the accompaniment. This integration of dance, music, and visual arts is expected to provide a learning experience that is both meaningful and aesthetically engaging.

Dance Art Creations

In developing the SDGs-based dance artwork, the researchers involved 40 pre-service elementary teachers who acted both as performers and creators. Their participation aimed to enable them to explore creative and innovative ways of delivering knowledge to elementary students. The artistic creation process referred to Alma M. Hawkins's theory in her book *Moving from Within: A New Method for Dance Making* (1991), which outlines three stages of dance creation: exploration, improvisation, and formation (Hawkins, 1991). During the exploration stage, the researchers formulated a storyline idea based on literature concerning natural resource preservation and related environmental issues. This idea was then developed into a narrative framework that served as the foundation for composing dance movements, orchestral music lyrics, and property designs. The researchers also conducted movement exploration by observing various dance videos themed around nature and ecosystems available on YouTube and TikTok. Inspired by these visual materials, the researchers and participants created choreographic movements using supporting properties such as recycled costumes, scarves, and other dance accessories.

The improvisation stage was carried out by combining various movements generated during the exploration phase to create a sequence that harmonized with the accompanying music. The movements were developed by considering the elements of space, time, and energy to enhance the expression of messages and emotions conveyed through the performance. At the same time, the lyrics and melodies of the accompanying music were composed to reinforce the message of natural resource preservation, using simple language that could be easily understood by students. Once all elements were fully developed, the process continued to the formation stage, which involved arranging the complete dance composition, designing floor patterns and group formations, synchronizing movements with the musical rhythm, and determining costumes and properties that supported the message in each scene.

Table 2. Storyline of SDG's Based Dance Arts

Scene	Story Idea	Setting	Duration	Performers
Introduction to natural resources	The story begins with a description of a lush forest filled with cheerful animals and plants.	Cheerful	7 minutes	16 dancers, 24 orchestra players
The arrival of hunters and looters	Tell the story of the arrival of a group of hunters and looters who killed animals and destroyed plants in the forest	Tense to sad	7 minutes	22 dancers, 18 orchestra players

Scene	Story Idea	Setting	Duration	Performers
The condition of a forest after destruction	It tells of the destruction of the forest by hunters, the death of many plants, and the loss of habitat for the animals. After that, the animals became angry and attacked the homes of humans.	Sad to tense	7 minutes	20 dancers, 20 orchestra players
Forest restructuring	It tells the story of human efforts to restore the forest by releasing captured animals and reforestation. Here, humans, animals, and plants are happy because the forest is back to its original state.	Cheerful	7 minutes	18 dancers, 22 orchestra players

The storyline presented in Table 2 served as the main guideline for developing the dance movements, orchestral accompaniment, and supporting properties, ensuring that the creation process remained clear and well-structured. Exploration of movement, music, and visual elements was conducted at different times, yet all creators continuously coordinated to maintain harmony across the components. Therefore, conceptual maturity and clarity of the storyline from the beginning were essential to facilitate artistic collaboration and ensure the cohesiveness of the SDGs-based dance performance (Brooks, 2014; Brown, 2017).

During the movement exploration process, the choreographer employed various forms of stimuli to generate creative movement ideas (Smith-Autard, 2010). The previously developed storyline served as the main ideational stimulus that guided the early phase of exploration (H'Doubler, 1998). In addition, visual stimuli were utilized by watching a range of environmentally themed dance videos sourced from platforms such as YouTube and TikTok. Drawing inspiration from these materials and the initial storyline, the choreographer began to move different parts of the body to discover suitable movement motifs. The choreographer also experimented with several properties such as animal-themed costumes made from recycled materials, leaves, weapons, and complementary accessories to enrich the movement vocabulary and enhance the expressive quality of the dance.

The movement exploration was conducted gradually according to the sequence of scenes in the storyline. This process lasted for four weeks and resulted in various original and meaningful movements aligned with the intended narrative. After generating a range of movement variations, the choreographer engaged in imitation sessions with the dancers, followed by an improvisation phase that explored possible combinations of the previously developed movements. During the improvisation stage, the choreographer refined the movements by considering the elements of space, time, and energy to determine the

appropriate range, level, tempo, and intensity that best conveyed the desired message and emotion to the audience (Kim, 2016). Throughout this process, adjustments were continuously made in coordination with the orchestral music accompaniment to enhance the dramatic and emotional impact of the performance.

Similar to the process of creating dance movements, the idea for composing the orchestral music also originated from the pre-developed storyline. The initial stage of the music composition process began with the writing of song lyrics. Lyrics serve as a linguistic symbol through which composers express emotions and assist listeners in grasping the intended meaning of a musical work (Merriam, 1964). In this study, the lyrics functioned as a verbal medium to convey messages about natural resource preservation. The inspiration for the lyrics was drawn from global narratives emphasizing the importance of environmental protection, along with practical examples of simple actions that elementary students can take in their daily lives.

After the lyrics were composed, the process continued with the orchestral music arrangement stage. The composer adjusted the melody, harmony, and tempo to align with the storyline and the emotional atmosphere of each dance scene. The arrangement process was carried out collaboratively between the composer and the choreographer to ensure that every change in rhythm, dynamics, and musical intensity supported the meaning of the movements and the intended message. According to Levitin (2006), the relationship between music and bodily movement is mutually influential, as both possess the power to evoke emotions and enhance the audience's perception of an artistic work. In this context, the synchronization between orchestral music and dance movements played a crucial role in creating artistic unity while deepening the educational message about natural resource conservation.

After the various dance movements, lyrics, and accompanying melodies were fully developed, the final stage formation was carried out. In this phase, the choreographer arranged the entire sequence of movements into a cohesive dance composition by organizing group formations, floor patterns, and the synchronization of movements with the orchestral rhythm. Meanwhile, the composer finalized the musical creation by combining all sections from each scene into a complete and harmonious orchestral composition to accompany the performance. Additionally, at this stage, the design and dimensions of the stage properties were determined, along with costume designs that complemented the overall aesthetic and thematic message. These preparations were made to ensure that all aspects of the performance effectively communicated the message of natural resource preservation.

Validation Result

After the SDGs-based artwork developed as a learning medium for sustainable living was completed, a validation process was conducted by three experts: an artist, an elementary school teacher, and a science literacy specialist. This validation aimed to assess the quality and relevance of the media in relation to the intended learning objectives. The validation process emphasized the integration of interactions between the dancers, teachers, and audience, as effective collaboration among these participants is considered essential for creating meaningful learning experiences and producing positive educational outcomes (Reigeluth & An, 2021).

Each expert was asked to evaluate thirteen statements covering the alignment of the artwork's content with the learning objectives. The assessment used a Likert scale ranging from 1 to 5, where 1 indicated "strongly disagree," 2 "disagree," 3 "neutral," 4 "agree," and 5 "strongly agree." The validation results from the three experts on the ten evaluated statements are presented in Table 3.

Table 3. Validation Questionnaire Results

No	Statement	Score (Artist)	Score (Teacher)	Score (Science Expert)	Average
1	The content contains important messages related to the SDGs (natural resource conservation).	4	5	4	4.3
2	The material in the content aligns with the learning objectives.	5	5	4	4.3
3	The dance art can explain the basic concept of sustainable living to students.	5	5	4	4.7
4	The dance art content encourages students to think critically about natural resource issues.	5	5	4	4.7
5	The message delivered in the dance art is relevant to the current condition of natural resources.	5	4	4	4.3
6	The dance art motivates students to take concrete actions in preserving natural resources.	4	4	4	4.0
7	The message in the dance art instills sustainability values in students.	4	5	5	4.7
8	The dance art material encourages students to discuss solutions to current natural resource problems.	4	4	4	4.0
9	The dance art conveys the importance of environmental conservation to students.	5	5	4	4.7

10	The dance art content contains accurate and relevant information about SDGs and sustainable living.	4	5	4	4.3
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Based on the validation results from the three experts, the average score indicated that the SDGs-based performance art was considered highly feasible and relevant for use as an environmental learning medium in elementary schools. The highest scores were found in statements number 3, 4, 7, and 9, each with an average of 4.7. These findings suggest that the dance art content was perceived as effective in conveying key messages related to the Sustainable Development Goals (SDGs), encouraging students to think critically about environmental issues, instilling sustainability values, and promoting awareness of the importance of natural resource conservation.

Meanwhile, the lowest average score of 4.0 was obtained for statements number 6 and 8, which referred to the dance content's ability to motivate students to take concrete actions in conserving natural resources and to encourage discussion on solutions to sustainability-related issues. These results indicate that although the overall evaluation of the learning media was highly positive, there remains room for improvement to enhance the dance performance's capacity to facilitate student reflection and discussion activities following the performance.

Based on these evaluation results, the researchers revised the storyline by adding both an opening and a closing scene. The opening scene was designed to depict a lush forest filled with joyful and harmonious living creatures, symbolized through lively yet gentle dance movements. Meanwhile, the closing scene portrayed humans taking responsibility for restoring the forest that had been damaged. The addition of these two scenes aimed to provide tangible examples of problems and solutions related to natural resource conservation while reinforcing the core message of sustainable living intended to be conveyed to the audience.

Overall, the validation results from the three experts indicated that the developed dance performance aligns with the learning objectives and serves as an effective educational medium for enhancing environmental awareness among elementary students. The experts agreed that integrating SDGs messages into dance art can transform abstract concepts into learning experiences that are more concrete, contextual, and meaningful for children. Thus, this artwork not only functions as a form of entertainment but also as an educational medium that harmoniously integrates cognitive, affective, and aesthetic elements within the learning process.

SDGs-Based Dance Arts

The SDGs-based artwork that had been developed and validated was then presented in a performance attended by elementary school teachers, students, and prospective teachers. The performance lasted for 28 minutes, featuring a harmonious combination of dance and pianica orchestra integrated into a single artistic presentation. The core concept of this artwork illustrates the consequences of failing to preserve natural resources while introducing various ways to maintain their sustainability, such as protecting forests from illegal logging, reforesting degraded areas, and safeguarding endangered animals as part of sustainable living efforts.

To visualize these ideas, the choreographer employed *gestures* or meaningful movements to represent each scene. For instance, in the segment depicting the forest's initial state, the dancers portraying animals and plants performed movements expressing joy and harmony, as illustrated in Figure 2.



Figure 2. The dancers portrayed animals and plants living happily in the forest

The delivery of the message was further reinforced through the use of props and costumes that represented the characteristics of each role. For instance, a firearm prop made from recycled cardboard was used to portray a hunter who damages the forest ecosystem through illegal hunting. Similarly, the role of a logger was depicted using an axe prop crafted from recycled cardboard, as illustrated in Figures 3 and 4.



Figure 3. Firearm property used by the hunter dancer



Figure 4. Tool property used by the looter dancer

This artwork also utilized various types of costumes representing animal and plant characters, all created from recycled materials. For instance, as shown in Figure 5, a costume made from used ropes was employed to symbolize one of the forest animals the monkey.



Figure 5. Costumes that visualize animals

Audience Response to SDGs-Based Dance Arts

Based on the questionnaire responses from 250 audience members, the combination of music, dance, props, and costumes used in the performance received highly positive evaluations. The audience assessed four main indicators: (1) the relevance of the artwork to the *Sustainable Development Goals* (SDGs), (2) the effectiveness of each performance element in conveying messages of sustainable living, (3) the dance artwork’s ability to motivate viewers to develop awareness of sustainable lifestyles, and (4) the artistic quality of each performance component. These four indicators consisted of 15 statements assessed using a 1–5 rating scale.

Table 4. The Result of the Audience's Response

No	Indicator	Aspect		
		Dance	Costume	Property
1	Relevance of the dance artwork to the SDGs	4.1	4.0	3.9
2	Ability to convey messages of sustainable living	4.0	3.9	3.9
3	Motivating ability	4.3	4.0	4.1
4	Artistic quality	4.0	4.0	4.0

The average scores indicate that the dance aspect achieved the highest rating, particularly in the indicator of motivating ability (4.3), suggesting that movement played the most significant role in delivering messages and fostering emotional engagement among the audience. The audience’s assessment of the performed artwork, as presented in Table 4, indicates that all

performance elements effectively conveyed environmental messages. Based on the results, the dance component demonstrated the highest relevance to the SDGs and was perceived as the most effective in delivering messages about sustainable living compared to other elements. In other indicators, dance was also regarded as more motivational and aesthetically appealing. Overall, the three elements dance, props, and costumes received highly positive evaluations, as reflected by the absence of any average score below 3.8. These findings suggest that the audience agreed that the developed dance artwork aligns with the SDGs, effectively communicates sustainability messages, fosters awareness of natural resource conservation, and possesses strong artistic quality.

Performing art elements such as dance and music, along with the use of props and costumes, play a crucial role in conveying messages about the environment and sustainable living (Heinrich & Kørnøv, 2022). The audience responded very positively to this approach, recognizing its ability to create meaningful learning experiences and inspire real actions toward natural resource conservation. In the context of education, success is not only measured through knowledge acquisition but also through the development of critical thinking, affective engagement, and pro-environmental behavior, which serve as key indicators of sustainability-oriented learning (Keller, Sommer, Klöckner, & Hanss, 2020).

This art-based environmental learning approach not only educates but also inspires students to take an active role in addressing environmental challenges and issues, aligning with the goals of education for sustainable development (Tao & Tao, 2024; Fleming et al., 2016). One audience testimonial stated that the combination of dance movements, props, and costumes was harmoniously presented and effectively conveyed the message. The integration of visuals and movements successfully built a strong and easily understood narrative, enabling audiences to grasp the message of environmental sustainability more deeply.

Overall, the findings of this study confirm that performing arts elements such as music, dance movements, props, and costumes can serve as powerful media for raising environmental awareness and encouraging concrete actions in support of natural conservation, in alignment with the *Sustainable Development Goals* (SDGs). The arts play a crucial role in fostering awareness, stimulating creativity, and inspiring innovation and action toward sustainable living (Peppler, Dahn, & Ito, 2022; Tao & Tao, 2024). Moreover, the creation of dance art serves as a pathway for active and lifelong learning, as it involves continuous creative exploration (Payne, 2019). Thus, this research contributes to the existing body of literature on the role of

performing arts in education, particularly in enhancing elementary students' understanding of sustainable living concepts.

CONCLUSION

Integrating art into learning to achieve the *Sustainable Development Goals* (SDGs) has proven to be an engaging and impactful educational approach. The study revealed that the developed artwork was designed to meet learning needs and objectives aligned with the principles of the SDGs.

The creation process of the dance artwork consisted of three main stages: exploration, improvisation, and formation. Expert validation confirmed that the developed performance art effectively serves as an educational medium to enhance students' understanding of sustainable living. The SDGs-based dance performance integrates elements of choreography, orchestral music, costumes, and props to portray environmental conservation issues in both artistic and educational ways.

The performance received positive responses from elementary students, teachers, and preservice teachers, who appreciated how the combination of movement, music, and visual design effectively communicated sustainability issues in an enjoyable manner.

Overall, integrating art into SDGs education not only enriches learning experiences but also fosters deeper emotional and cognitive engagement with the meaning of sustainable living. This approach encourages environmentally conscious behaviors and provides new perspectives for understanding and communicating sustainability concepts.

By fostering environmental awareness through dance, students are expected to become responsible citizens who care for nature and contribute positively to sustainability in their communities.

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