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Grow the Plant!: An Environmental-Themed Board Game as A Sustainable Living Learning Medium for Elementary School Students

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Abstract: Grow the Plant!: An Environmental-Themed Board Game as A Sustainable Living Learning Medium for Elementary School Students. Objectives: This research aims to enhance awareness and understanding of sustainability issues through an enjoyable educational game at the UNESA Laboratory Elementary School. **Methods:** This research employs the Design Thinking method with qualitative data analysis. There were 20 participants aged 8-12 years who participated in answering the research questionnaire. Data is presented and described based on the percentages obtained from the questionnaire results. **Findings:** This research indicates that 90% of the users of the "Grow the Plant!" board game better understand the importance of plants for environmental sustainability and examples of actions in caring for plants in daily life. **Conclusion:** Through a board game approach, children can develop awareness and commitment to fostering a positive attitude towards the environment, stimulate their interest in plant cultivation, and provide a foundational understanding of the importance of sustainable living

Keywords: board game, sustainable living, elementary school.

Abstrak: Grow the Plant!: Papan Permainan Bertema Lingkungan sebagai Media Pembelajaran Kehidupan Berkelanjutan bagi Siswa Sekolah Dasar. Tujuan: *Penelitian ini bertujuan untuk meningkatkan kesadaran dan pemahaman mengenai isu-isu keberlanjutan melalui permainan edukatif yang menyenangkan di Sekolah Dasar Laboratorium UNESA,* ***Metode:*** *Penelitian ini menggunakan metode Design Thinking dengan metode analisis data Kualitatif. Terdapat 20 peserta berumur 8-12 tahun yang berpartisipasi dalam menjawab kuesioner penelitian ini. Data disajikan dan dideskripsikan berdasarkan presentase yang diperoleh dari hasil kuesioner.* ***Temuan:*** *Hasil penelitian ini menunjukkan bahwa 90% peserta pengguna papan permainan "Grow the Plant!" lebih memahami pentingnya tanaman untuk keberlanjutan lingkungan dan contoh tindakan dalam merawat tanaman dalam kehidupan sehari-hari.* ***Kesimpulan:*** *Melalui pendekatan permainan, anak-anak dapat membangun kesadaran dan komitmen dalam mengembangkan sikap positif terhadap lingkungan, merangsang minat mereka dalam menanam tanaman, serta memberikan dasar pemahaman mereka tentang pentingnya hidup berkelanjutan.*

Kata kunci: *papan permainan, kehidupan berkelanjutan, sekolah dasar.*

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INTRODUCTION

Environmental damage is a highly complex issue involving many aspects, such as climate change, biodiversity loss, water and air pollution, and land and forest degradation. Environmental damage was caused by various factors, such as unsustainable consumption and production patterns, the use of hazardous chemicals, land conversion for agriculture, and deforestation (Akhmaddhian, 2016). Deforestation is the large-scale removal of forests. The impacts of deforestation are significant and affect human life, wildlife, and the environment as a whole. Almost every year, Indonesia faces forest fires with 1.7 million hectares burned in 2015, resulting in a severe haze disaster that significantly impacted education, air transportation, health, the economy, and the environment (Adiputra & Barus 2018). In the long term, deforestation can exacerbate climate change and deteriorate environmental quality, which can affect human health because forests are the most enormous carbon absorbers on earth. In the context of children, concerns about environmental damage are becoming increasingly important because they are the future generation that will inherit this earth. Numerous scholars concur that achieving sustainability hinges on how societies educate the upcoming generation. It is imperative to seriously consider how we can ensure that children's learning experiences become sustainable and what they are taught about the world that surrounds them (Borg, Winberg, & Vinterek, 2017).

Children need to be taught environmental-friendly conduct from a young age. This behavior is the same as their daily routines, and personal attitudes affect patterns. If people are thrilled to do something, they will continue to do it, and ultimately, the action will become a habit. This habit affects actions that benefit the environment (Herdiansyah et al. 2021). Children often imitate environmental activities because they may need to gain the knowledge to distinguish between behaviors that preserve and harm the environment. The ideals established in a kid by their parents and instructors influence their subjective norms. Youngsters spend more time with their families and at school, so these interactions significantly impact what they see. It takes a mix of attitude and perceived behavior control to modify individual actions, however depending just on social norms is insufficient (Hagger & Chatzisarantis, 2016). Their connections to a person's inner motives, attitude, and perceived behavioral control directly impact behavior (Ryan & Deci, 2020) .

To promote good community attitudes, increase environmental awareness, and improve individual competencies for implementing eco-friendly acts, environmental education is a complete system that includes a variety of programs, methods, and techniques (Al-Jarrah et al. 2019). This form of environmental education encompasses different levels, including individuals, communities, and the preservation of ecosystems on the brink of extinction. According to Stern and colleagues (Noda, Shirotsuki, & Nakao, 2019), a positive correlation exists between knowledge, awareness, expertise, attitudes, and behavior regarding the environment. The duration of formal education directly impacts the level of knowledge individuals attain. While people can acquire pro-environmental knowledge through schooling, it doesn't necessarily substantially influence their ecological behaviors. Numerous other factors play a role in shaping ecological behaviors, including personal experiences and environmental consciousness (Ristanto et al. 2020). The Decade of Education for Sustainable Development, which ran from 2005 to 2014, was established to promote education for sustainable development in all aspects of teaching and learning. The 2030 Agenda for Sustainable Development, released at the close of the decade, outlines a new course of action for people, the planet, and prosperity.

By 2030, all students should have the knowledge and abilities required to promote sustainability, according to this plan's 17 sustainable development goals (Borg et al. 2017).

The selection of the right audience for teaching materials needs to consider children's characteristics and psychological conditions. In this research, the target audience was children aged 8-12 years. At this stage, children enter the concrete operational stage, where they can think logically about concrete events and classify objects into different categories. They can classify things but may not yet be able to solve abstract problems (Marinda 2020). Children in the Elementary school years, between the ages of 8 and 12, can engage in logic-based learning and activities using physical objects throughout their development (Khaulani, Neviyarni, & Murni 2020). Children are now able to comprehend intricate ideas and refine their critical thinking abilities. Additionally, they learn more sophisticated social and emotional skills including empathy and understanding others' emotions. Children's attitudes and actions for adjusting to their surroundings, such as responsibility, politeness, honesty, and respect, have been investigated (Khasanah, PH, & Indrayati 2019). Children are also aware of the standards, customs, and laws that govern society. Children at this age learn best using instructional strategies emphasizing social interaction and teamwork (Dewi, S, & Irdamurni 2020).

Children's experiences and skills may be improved by choosing educational materials to hold their interest, attention, and motivation during the teaching and learning process (Dziob 2020). Therefore, utilizing instructional tools that are not constrained by time or space but instead may foster an enjoyable environment and encourage children's activities may be a solution. Board games are an appropriate medium for the target audience, according to the consideration of a number of aspects (Kesuma et al. 2020). A board game is a type of game that uses a board as its main tool and is played by more than one person to enhance social interaction. This game can be adapted to various learning themes, such as education, provides recreational activities and group play, and can direct players to play competitively, cooperatively, and collaboratively (Najib and Yuniarti 2018). Since board games may be played by players of all ages, including adults, they are frequently used as a teaching tool. The audience is likely familiar with board games like Monopoly, Snakes and Ladders, and Ludo. Due to player interaction and communication, board games are also interactive media. Communication skills may be developed through board games (Noda et al. 2019). Furthermore, playing board games for an extended time won't impair vision or lower visual acuity owing to screen radiation (Christian & Prasida 2018).

The primary advantages of board games are their ability to promote enhanced communication and active learning through player engagement. When individuals play board games, they manipulate game pieces on boards with specific patterns, often involving nonverbal interactions. Furthermore, playing board games fosters social gatherings and enjoyable group activities, potentially strengthening individuals' social connections, which may help prevent cognitive decline (Nakao 2019). An examination of 11 studies utilizing board games to enhance knowledge acquisition revealed that board games can effectively improve comprehension, boost interpersonal interactions among participants, and increase participant motivation. Moreover, board games have been identified as a supportive learning tool because they enhance participant motivation and promote interpersonal interactions (Noda et al. 2019). Academically, those in the experimental group exposed to board games during their learning sessions outperformed those in the control group, who were not exposed to board games (Al-Jarrah et al. 2019).

Students need learning media that suit their characteristics, which affects their psychology because their understanding is related to the learning media (Ristanto et al. 2020). Board games help students comprehend the subject matter and sharpen their problem-solving skills. Board games have the potential to be an effective and entertaining alternative learning medium for children (Dwi Safitri 2020) Therefore, using board games as a learning medium needs to be continuously developed and integrated into the elementary school learning process. This board game product could be an effective medium for teaching social values to children and help them develop an environmental awareness from an early age. Board games have the potential to be an effective and entertaining alternative learning medium for children. As a result, the use of board games as a teaching tool must be continually improved and incorporated into the curriculum for elementary schools. This board game product could be an effective medium for teaching social values to children and help them develop an environmental awareness from an early age

METHODS

Participants

This research was conducted at the UNESA Laboratory Elementary School. The subjects of this study were students in grades 3-6 who scored below 6 in the environmental education subject. As a result, the research was conducted on 20 students (5 students from grade 3, 4 students from grade 4, 6 students from grade 5, and 5 students from grade 6).

Research Design and Procedures

This research employs a mixed methods approach, combining design thinking with qualitative descriptive as the method for data collection and analysis. According to Chai et al. (Chai et al. 2021) qualitative research is used to gather information on people's character, behaviour, beliefs, and personal characteristics of people or organizations. The investigator uses qualitative research as a methodology for understanding deeply meaningful and insightful things about societal problems affecting certain persons or groups context.

Design Thinking is a method of problem-solving that emphasizes good team communication and cooperation while prioritizing creative solutions to various problems or obstacles. According to research, this strategy may improve educational quality, raise student engagement, and promote students' independence by encouraging their curiosity and teaching them to investigate ideas independently (Tu, Liu, & Wu 2018). Multiple studies have shown that the design thinking method may improve students' problem-solving capabilities, teamwork, creativity, and creative thinking skills; as a result, the application can make learning materials more relevant (Jeon 2019). According to Anderson's research from 2013, the implementation may be improved even further by utilizing students' imaginative and creative abilities. Empathy, collaboration, relationship-building, and creativity are just a few cognitive skills design thinking can improve (Noel & Liu 2016). Design thinking can be enhanced by incorporating teaching strategies or models that encourage students' original thoughts and challenge their cognitive processes (Darminto 2013). Therefore, the capacity for creative thought can highlight pupils' uniqueness and originality. The inclusion of both learning models and creative thinking as study variables would have a substantial influence on the area of education. However, we focus on examining how students' creative thinking abilities fit within a series of novel teaching strategies (Palupi et al. 2020). From the provided description, one can infer that design thinking skill entails the capacity

to generate fresh creations in the shape of products by merging data, information, and components that can give rise to novel concepts or artifacts (Batlolona et al. 2019). Design thinking comprises five stages to be implemented, which are:

Figure 1. Design thinking stages

The design thinking method consists of five procedures: empathize, define, ideate, prototype, and test. In the empathize stage, the researcher formulates the issues occurring in society, and the identified problems are then observed and thoroughly dissected. Subsequently, the collected data is analyzed to find an implementable solution. This research was conducted at the Elementary Laboratory School of UNESA, Ketintang, Surabaya. This elementary school has a weekly program for practicing sustainable living, such as trash separation, not littering, bringing plants from home, and using a tumbler for school meals. Despite the school's efforts to provide a sustainable living program, the observed condition still indicated a need for students' concern for the plants they bring. Many of the plants placed in the front of the classroom were not well-maintained, withering, and eventually dying. Based on this, the proposed solution was an education about sustainable living for the Elementary Laboratory School of UNESA students through a board game medium.

In the Define stage, primary and secondary data are collected. Primary data is obtained through interviews with teachers and students of the Elementary Laboratory School of UNESA Surabaya and board game practitioners. Secondary data can be obtained through documentation of books, journals, and articles accessible online or in physical form. Afterward, the collected data is analyzed using the 5W+1H method. Once the data is processed, it is transformed into recommendations and design concepts. These recommendations and design concepts are then implemented in the content, gameplay, and board game interface for educating students about sustainable living. After the design concept is formed, it is materialized into a prototype of the board game, starting with the initial design sketch, material selection, and creating a mock-up of the board game for educating elementary school students about sustainable living. After the prototype is completed, a test of the board game is conducted at the UNESA Laboratory Elementary School with 20 students from grades 3-6.

Instrument

This data was obtained from questionnaires. According to (Taherdoost 2016), a questionnaire is one of the most frequently used data collection techniques in social science research, with the primary goal of obtaining important information most accurately and reliably. The questionnaire instrument also allows us to comprehend the participants' opinions, dislikes, views, and preferences (Creswell & Poth 2016). The questionnaires were distributed to 20 students in the UNESA Laboratory Elementary School,

grades 3-6. The questionnaire covered two main topics: sustainable living and the board game "Grow the Plant!" as a learning medium.

Data Analysis

The survey's results were evaluated. The frequencies for each statement were calculated first, then the result will be processed using Likert scale calculations in the form of percentages. After that, each statement was categorized and the findings were evaluated descriptively. The conclusions were then compiled to address the research topic.

■ RESULTS AND DISCUSSION

Empathize

In this empathize stage, the researcher conducted observations at the UNESA Laboratory Elementary School with teachers and students as a subject. The observation results

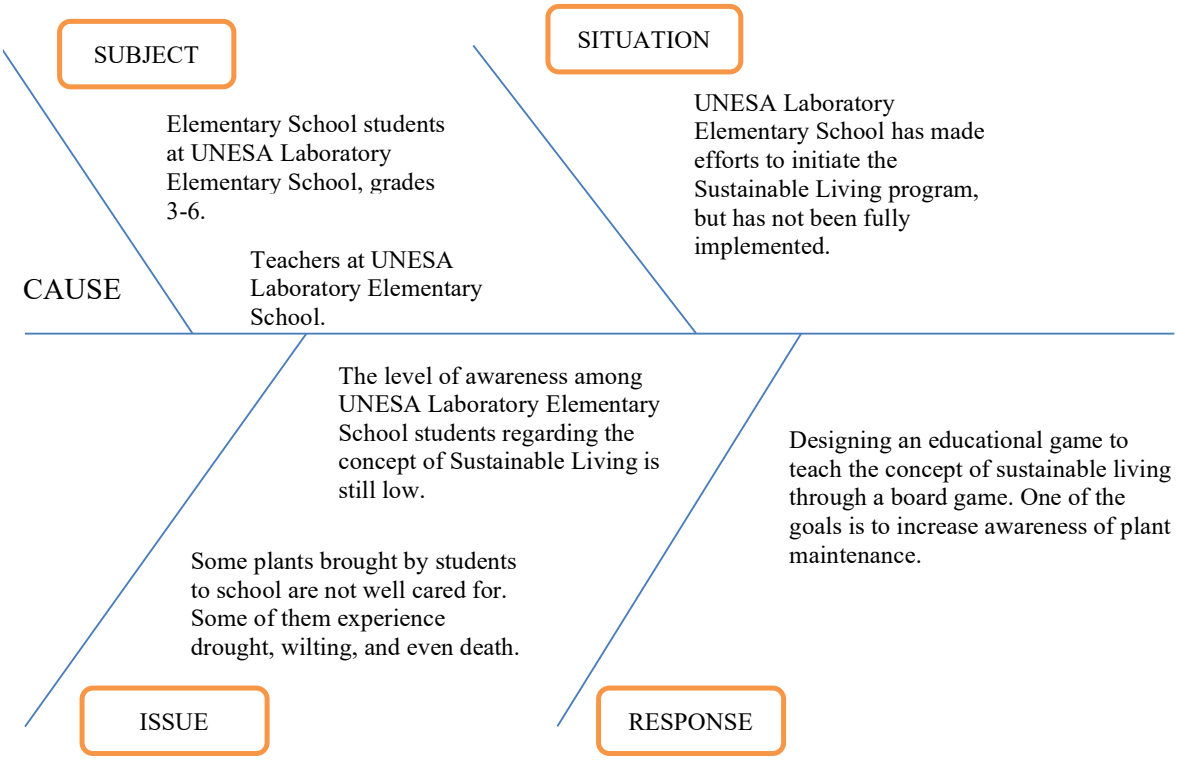

Figure 2. Data analysis framework

indicate that UNESA Laboratory Elementary School already has a program to introduce sustainable living to students, one of which is by bringing plants from home. However, a problem arose: the student's awareness of the concept of sustainable living is still low, as seen from the plants they bring from home being placed in the front garden of the classroom without proper care, leading to dehydration and even death. The researcher's response was to design an educational game as a learning medium, with one of its goals being to introduce sustainable living to the students.

Define

The primary and secondary data collected are then analyzed using the 5W+1H formula (What, When, Where, Why, Who, How) to formulate a creative concept for the message of sustainable living to elementary school students.

Table 1. 5W+1H analysis

5W+1H	The analysis results
What: What are the forms of sustainable living behavior that elementary school children can engage in within the school environment?	Based on the interviews with teachers from the UNESA Laboratory Elementary School, some of the activities students have successfully implemented regarding sustainable living include waste separation, reusable tumblers, and eco-friendly shopping bags. However, when bringing and caring for plants, students still need to gain awareness.
Who: Who are the recipients of the sustainable living message?	In this research, students from grades 3 to 6 are expected to be responsible for applying the concept of sustainability in the context of the environment.
When: When was the appropriate time to convey messages about sustainable living to children? And when was the time to measure the achievements of the board game's objectives?	Based on interviews with teachers from the UNESA Laboratory Elementary School, the message about sustainable living will target students in grades 3 to 6, and measurements can be taken before and after it is applied to the students.
Where: Where was the right place to deliver educational messages about sustainable living to children?	Identification will be carried out in Elementary Schools in grades 3 to 6, and the reason for choosing schools as the location was that the most effective learning time for children aged 8-12 was when they are in school. Furthermore, the UNESA Laboratory Elementary School already has a program for introducing sustainable living, so students have some understanding of the concepts that will be developed in a board game.
Why: Why introduce education about sustainable living to children?	Because children are the future generation who will determine the sustainability of the environment, education at elementary schools teaches children to become environmentally conscious consumers. They learn to consider the environmental impact of the products they purchase, reduce waste, and support sustainable business practices. These activities can shape responsible consumption behavior that positively impacts the environment.
How: What are the forms and creative learning models used to introduce sustainable living at school?	Based on interviews with UNESA Laboratory Elementary School teachers, the school's existing program for introducing sustainable living includes bringing plants from home, waste separation, and reusable tumblers from home. A board game about sustainable living can be a supporting tool to ensure the school's program is implemented effectively.

Ideate

"Grow the Plant!" is a team-based board game designed for a minimum of 2 players with one guide and a maximum of 6 players. Each session of the game lasts for 30-45 minutes. The gameplay begins with the first player and proceeds clockwise, with each player taking turns until the game is completed. The determination of the first player can be made by mutual agreement among all players. During a player's turn, they must roll the dice to determine how many steps the pawn needs to move towards the intended position. There are various stopping positions with different attributes: Positive Points (+) such as Sun, Water, and Fertilizer, and Negative Points (-) such as Pests, Viruses, and Fungi.

Some stopping positions also have two types of cards, which are Grow Cards and Plant Cards. Grow cards containing information about the plant's good and bad conditions. Points are deducted for drawing a card with information about a bad condition, and points are added for drawing a card with information about a good condition. Meanwhile, Plant Cards contain information about different plants with different bonus points. Each time a pawn stops at a position, the player must complete a mission according to the instructions on that position. The guide in the game must know whether the player has chosen a positive or negative instruction on the card. Accumulated points can be exchanged for a tree puzzle, and the participant with the highest tree puzzle at the end of the game wins.

Prototype

The board game's title, designed to introduce sustainable living to elementary school children was "Grow the Plant!" This title resulted from brainstorming within the theme of sustainability in the context of deforestation issues. Through the board game "Grow the Plant!", the hope was that children could better understand the importance of reforestation activities for the environment's sustainability. Children can start implementing the values of reforestation in small ways around them, such as getting to know various plants and their benefits, planting plants, taking care of them, and paying attention to what things have positive and negative impacts on plants.

Figure 3. Design of main board, puzzle, and packaging

Logo Board Game

The board game logo design utilizes a visualization of a sprout that was beginning to grow leaves at the top. The visual representation of the sprout was given anatomy with eyes and a mouth to create the impression of it being alive and growing as a subject, not just an inanimate object, making the logo appear more engaging and interactive. The colors used in the logo are synonymous with earthy tones, namely yellow, green, and brown.

Pawns Design

The design of the pawns in the board game "Grow the Plant!" uses characters representing various plants with a cheerful and expressive visual style. The selection of plant shapes was an interpretation of the game's title, "Grow the Plant!" The visual plants that thrive in tropical climates are commonly found in household pots, such as elephant ears, mother-in-law's tongue, and succulents.

Main Board Design

The main board design of Grow the Plant! measures 35 x 35 cm. The main board design visualizes six pawn characters gathered in a garden. These six pawn characters are seen carrying gardening tools such as buckets, shovels, rakes, and watering cans. They are seen surrounding a visualization of newly planted plants. The main board contains 40 spaces containing positive and negative points, resting zones, and grow & plant cards. The "Grow the Plant!" game system has rules similar to the game of Monopoly. Each player will move a pawn and gain or lose points according to the stopping spaces. Positive spaces feature characters like water, sun, and fertilizer; their points will increase if a player lands on a positive space. Conversely, negative spaces feature characters like caterpillars, mushrooms, and viruses. If a player lands on these spaces, their points will be deducted.

Card Design

The design of the "grow" cards uses green color, and on the front, there was a visualization of a sprout, which is also used in the Grow the Plant! logo. On the back of the card, there was information describing either good or bad conditions that could happen to the plant. If a player draws a card containing a bad condition

Figure 4. Grow & plant card design

statement, the pawn is asked to move the card's instructions to a negative space, and points will be deducted. Similarly, if a player draws a card containing a good condition statement, the pawn is asked to move the card's instructions to a positive space, and points will be added. The purpose of these "grow" cards was to educate children about the positive and negative factors that can affect plants. Meanwhile, the "plant" cards use yellow color, and on the front side, there was a visualization of a sprout, which was also used in the Grow the Plant! logo. There was interesting information about plants on the back of the card, along with additional points. Unlike the "grow"

cards with negative points, the "plant" cards only have additional points. The purpose of these "plant" cards was to enhance children's knowledge about various types of plants so that when children learn about the benefits of these plants, their awareness of taking care of plants will increase.

Puzzle Design

Tackling a puzzle game encompasses exploration, uncovering, mental imagery, anticipation, and problem resolution. Consequently, when students complete a puzzle challenge, they encounter a sense of satisfaction, which holds significance because the sense of accomplishment gained from overcoming challenges bolsters their self-assurance to tackle fresh ones (Rodenbaugh et al. 2014). The puzzle design used in the Grow the Plant! board game features a visualization of a mango tree. The puzzle consists of several pieces with 25, 50, and 100 point values. The size of each puzzle piece fits its point value. The maximum value of a completed puzzle forming a tree was 1500 points, so the player who first reaches this point value becomes the winner.

Design of the game guide sheet

Next is a game guide sheet containing the game flow, rules, and criteria for determining the winner. During the game, the game facilitator can hold the game guide sheet. Overall, the game guide sheet acts as a comprehensive tool that empowers the guide to effectively manage and enhance the gaming experience for all participants.

Design of the board game packaging

The board game packaging was a box with 23 cm x 35 cm x 6 cm dimensions. On the top and bottom sides of the box cover, some magnets can be attached to the inside to close it. The box cover also serves as the main game board on the reverse side.

Test

The first trial of the board game Grow the Plant! was conducted with the School Principal and Environmental Education teachers at the Laboratory Elementary School of UNESA. Based on the interviews, the content presented in the board game was considered suitable. The explanations, which were simple and drawn from everyday examples, were seen as making it easier for children to understand and implement the taught material. The presented was considered sufficient, neither too much nor too little.

The second trial was conducted with a board game design expert from Tabletoys Surabaya. Based on the interview, the board game Grow the Plant! was deemed quite engaging and suitable for children aged 8-12 years. The selection of visual character pawns and the main board layout that fits the plant theme made it attractive for children to play with cute and non-boring plant visuals. Additionally, the board game had interactive elements with the Grow & Plant cards in the game. In terms of information, cards, and visuals presented, they were considered clear and easy to understand. The card size was easy to hold and suitable for children's hands. In terms of time, the game duration could be shortened if the maximum number of puzzle points achieved were reduced.

After the board game Grow the Plant! was deemed suitable for testing on the research target, further testing was conducted with 20 participants consisting of five students from each of the 3rd, 4th, 5th, and 6th grades of the Laboratory Elementary School of UNESA. The testing was done by providing a questionnaire to Grow the Plant! players. The questionnaire content was divided into two types of questions. The first type of question tested the participants' understanding of the importance of plant functions for the sustainability of living organisms. The second type of question asked for their opinions about the board game they had just played.

This study employs the Likert Scale as its measurement tool, a widely utilized psychometric scale in surveys. It comes in two question forms: positive queries gauge favorable interest, while negative ones assess adverse interest. Positive questions are assigned scores of 4, 3, 2, and 1, whereas negative questions follow a scoring of 1, 2, 3, and 4. The Likert scale response choices include strongly agree, agree, disagree, and strongly disagree.

Table 2. Research instruments about board game

Board Game Grow the Plant!	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
The explanation of the board game rules was easy to understand.	17	1	2	0	0
The gameplay was easy and enjoyable	10	6	4	0	0
Card, board, and puzzle preparation was easy to prepare at the beginning of the game	11	5	4	0	0
The size of the card was appropriate and easy to hold.	14	6	0	0	0
The visual design of the pawns, packaging, rules, and cards was attractive.	13	3	4	0	0
The typeface used on the packaging, rules, and cards was legible and easy to read.	19	1	0	0	0
There was interaction among players during the game.	18	2	0	0	0
The game duration was relatively fast	8	8	4	0	0
I want to play it again and invite friends to play.	13	5	2	0	0

Table 3. Research instruments about sustainable living theme

Sustainable Living Theme	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Understanding the importance of the role of plants in environmental sustainability.	10	7	3	0	0
Understanding what reforestation means	8	12	0	0	0
Understanding how to take care of plants properly.	10	10	0	0	0
Implementing environmentally friendly behavior.	15	5	0	0	0

Interpretation of Calculation Scores

Y: the highest Likert score x the number of respondents

X: the lowest Likert score x multiplied by the number of respondents

Very Agree, Y : 5 x 20 : 100

Very Disagree, X : 1 x 20 : 20

Interval Formula

Index Formula % : Total score / Y x 100

Index Formula : 10 / 5

Index Formula : 20

Criteria for interpreting scores based on intervals are as follows:

Scores from 0% to 19.99% : Very (disagree/ poor/very low)
Scores from 20% to 39.99% : Disagree / Not good
Scores from 40% to 59.99%: Adequate / Neutral
Scores from 60% to 79.99% : (Agree/Good/like)
Scores from 80% to 100% : Very (agree/Good/ Like)

Likert Formula

Total score / Y x 100

Table 4. Results of the board game effectiveness test

Board Game Grow the Plant!	Strongly Agree (5 point)	Agree (4 point)	Neutral (3 point)	Disagree (2 point)	Strongly Disagree (1 point)	Total Score
The explanation of the board game rules was easy to understand.	85	4	6	0	0	95%
The gameplay was easy and enjoyable	50	24	12	0	0	86%
Card, board, and puzzle preparation was easy to prepare at the beginning of the game	55	20	12	0	0	87%
The size of the card was appropriate and easy to hold.	70	24	0	0	0	94%
The visual design of the pawns, packaging, rules, and cards was attractive.	65	12	12	0	0	89%
The typeface used on the packaging, rules, and cards was legible and easy to read.	95	4	0	0	0	99%
There was interaction among players during the game.	90	10	0	0	0	100%
The game duration was relatively fast	40	32	12	0	0	84%
I want to play it again and invite friends to play.	65	20	6	0	0	91%

Table 5. Results of the sustainable living theme effectiveness test

Sustainable Living Theme	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Total Score
Understanding the importance of the role of plants in environmental sustainability.	10	7	3	0	0	87%
Understanding what reforestation means	8	12	0	0	0	88%
Understanding how to take care of plants properly.	10	10	0	0	0	90%
Implementing environmentally friendly behavior.	15	5	0	0	0	95%

Based on the data from the distributed questionnaires, 95% of the respondents said that the board game's rule explanations were easy to understand. 86% of the respondents found the board game's gameplay easy and enjoyable. 87% of the respondents said the preparation process for cards, the board, and puzzles at the beginning of the game was easy. 94% of the respondents

found the card design easy to hold. 89% of the respondents found the visual design of the pawns, packaging, game rules, and cards appealing. 99% of the respondents said the fonts used on the packaging, game rules, and cards were legible. 98% of the respondents said that they interacted with each other while playing. 84% of the respondents said the game's duration was relatively fast if played for one round. Regarding replayability, 91% of the respondents said they wanted to play Grow the Plant! again and invite their friends to play.

After playing the "Grow the Plant!" board game, in terms of the delivery of sustainable living content, 87% of the respondents agreed on the important role of plants in the sustainability of the environment. Then, 88% of the respondents began to understand what reforestation means. Through the material in the board game, 90% of the respondents understood how to take care of plants properly, and 95% were aware of the importance of implementing environmentally friendly behavior in their daily activities. Some representative classroom teachers interviewed stated that the Grow the Plant! board game is an innovative and engaging learning tool for teaching the concept of sustainable living, as evidenced by the high enthusiasm of the students while playing this board game. Based on the questionnaire results and interviews conducted, it can be concluded that the Grow the Plant! board game helps respondents understand various examples of efforts to implement sustainable living through tree planting.

■ CONCLUSIONS

"Grow the Plant!" board game as a learning tool for sustainable living through tree planting in daily life was well-received by children. 90% of the children said that after playing "Grow the Plant!", they better understand the importance of plants for the sustainability of the environment and examples of actions in taking care of plants in daily life. The board game becomes a learning medium that makes learning activities more fun. Through a game-based approach, children can develop a positive attitude towards the environment, stimulate their interest in planting, and provide a basic understanding of the importance of sustainable living. Therefore, this game was a learning tool and a tool for building awareness and commitment among children to a greener and more sustainable future.

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