MAK TANI: DEMOCRATIC PARTICIPATION IN AN INTEGRATIVE ECO-SOCIOPRENEURSHIP LEARNING FRAMEWORK FOR EARLY CHILDHOOD VEGETABLE EDUCATION

Carolina Lita Permatasari
Universitas Kristen Satya Wacana, Indonesia
carolina.permatasari@uksw.edu

Kristina Roseven Nababan
Universitas Kristen Satya Wacana, Indonesia
kristina.nababan@uksw.edu

Abstract

Sustainable food education in early childhood can benefit from learning experiences that connect children with food production, environmental responsibility, and social participation. This qualitative practice-based study examined the development and pilot implementation of the *Mak Tani* ("Mari Kita Tanam dan Nikmati"/Let Us Plant and Enjoy") program at TK Kartika Salatiga, Indonesia. The study used a design thinking approach involving 17 children as the main participants and teachers, the school principal, and parents as adult informants. The Mak Tani prototype consists of a 5M learning design: planting seeds, caring for vegetables, harvesting vegetables, processing vegetables, and consuming vegetables, integrating experiential learning, democratic participation, environmental education, food literacy, and an early childhood adaptation of the people–planet–profit perspective. Qualitative evidence from observations, documentation, and follow-up interviews indicated increased participation in gardening activities and greater willingness among some children to taste vegetables they helped grow and prepare. Parents also reported that some children discussed the gardening experience at home and appeared more open to trying vegetables. These findings provide promising practice-based evidence, rather than causal proof, that a "seed to plate" learning trajectory may support children's engagement with vegetables and related environmental and social learning. The study's contribution is articulating the 5M design as an integrative pedagogical framework that operationalizes democratic participation through concrete, developmentally appropriate food learning experiences. Because the study involved one institution, 17 children, one planting cycle, no comparison group, and predominantly qualitative evidence, the findings should not be generalized as proof of effectiveness. Future research should test and refine the 5M stages using larger samples, comparison designs, longer follow-up, and structured behavioral measures.

Keywords*:* Eco-sociopreneurship, Democratic participation, Design thinking, Experiential learning, Food literacy, Early childhood education.

INTRODUCTION

Sustainable food security is a global strategic challenge in the contemporary era for countries worldwide. In a global context filled with climate uncertainty and geopolitical dynamics, a nation's ability to meet its food needs independently is a crucial indicator of national sovereignty. This challenge requires a holistic approach involving all elements of society, including the younger generation, to ensure the food system's sustainability. Indonesia, with its large population, is no exception to this food security challenge. The Indonesian government under the leadership of

President Prabowo Subianto has shown serious commitment by targeting food self-sufficiency, supported by a budget of Rp 139.4 trillion to finance all food security programs in 2025, a significant increase of 21.9 percent from the previous year[1].

Sustainable food systems increasingly require educational approaches that connect food literacy with environmental awareness, social participation, and everyday behavior. Evidence from school-based nutrition research suggests that programs incorporating experiential environmental sustainability components such as gardening, tasting, and cooking may be more likely to report improvements in children's fruit and vegetable consumption than programs without such components, although the quality of evidence remains variable. A recent systematic review of 18 school-based studies involving children aged 5–12 years found that programs combining nutrition education with experiential sustainability components were more likely to report significant improvements in fruit and vegetable consumption or variety, while also emphasizing the need for stronger study designs and process evaluation[2]. School-garden research similarly indicates potential benefits for nutritional knowledge, attitudes, acceptability, and dietary practices, but effects vary according to intervention duration, parental involvement, age, sample size, and program components.

Sustainable food security requires more than macro-level policies; it also requires fundamental changes in how society thinks, starting early through education based on democratic participation and an environmentally conscious entrepreneurial spirit. Ecopreneurship is an entrepreneurial practice that views business opportunities from an environmental sustainability perspective[3]. In its implementation, ecopreneurship aims to build and operate businesses that minimize negative impacts on the environment while optimizing social and economic benefits for the community[4]. From another perspective, sociopreneurship itself is the activity of organizing innovative businesses, mobilizing resources to solve social problems, and effectively bringing about social change[5]. The development of this concept then gave birth to eco-sociopreneurship, which integrates the three pillars of sustainable development economic, social, and ecological into a single framework of entrepreneurial activities, thereby promoting the realization of a food system that is both fair and environmentally friendly.

In education, applying eco-sociopreneurship through democratic children's involvement is an important strategy for shaping a future generation that not only cares about nature conservation but also has the competence to recognize and use business opportunities that contribute positively to food security. Children's democratic participation in eco-sociopreneurship learning enables them to be actively involved in the decision-making process, develop critical thinking, and build innovative solutions to food and environmental problems around them. Through this participatory approach,

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children are not only passive consumers of knowledge but also agents of change who can implement the values of sustainable entrepreneurship in real life[6].

Implementing eco-sociopreneurship theory in vegetable-planting activities is specifically designed to address concrete challenges in increasing early childhood children's interest and willingness to consume vegetables, particularly at Kartika Salatiga Kindergarten. The difficulty of getting children to consume vegetables is a problem faced by parents. The reality on the ground shows that children's involvement in school food security programs still needs to be strengthened, even though it has great potential to provide children with insight and knowledge about the importance of protecting the environment and maintaining the balance of nature[7]. Children's democratic participation in decision-making related to the use of school green spaces is still limited, even though this active involvement can be an effective instrument for building character, independence, environmental awareness, and a spirit of sustainable social entrepreneurship. This program encourages children to develop deep emotional and cognitive relationships with vegetables through direct involvement in the entire production process. They learn not only the technical aspects of planting, caring for, and harvesting vegetables, but also their nutritional value, health benefits, and importance in a balanced diet. Active involvement in the cultivation process creates a sense of ownership of the harvest, which psychologically increases intrinsic motivation to eat the vegetables they grew themselves. Intrinsic motivation comes from within the children's personalities and can encourage them to take action to learn. Intrinsic motivation arises based on awareness of specific goals, not just attributes or ceremonies[8].

Vegetable planting activities are presented as a holistic educational innovation that integrates participatory learning in developing eco-sociopreneurship character in early childhood. The participatory learning model emphasizes children's active involvement in learning. The participatory learning model encourages children to think critically, solve problems, and make decisions[9]. This program goes beyond simple gardening activities and creates an interactive learning space that allows kindergarten/early childhood education children to be actively involved in the entire vegetable cultivation process in accordance with their cognitive development stages. Through direct involvement, starting from seed selection, planting, maintenance, to harvesting, children not only gain basic knowledge about agriculture, but also develop observation skills, cooperation, and a sense of responsibility. Equally important, this program aims to foster children's interest and enthusiasm for vegetable consumption through the direct experience of planting and caring for their own vegetable plants, while maximizing the use of school land and building environmental awareness from an early age.

This study is significant in examining how active participation in vegetable planting activities can catalyze the formation of eco-sociopreneurship character in kindergarten/early childhood education children, while contributing to a sustainable food security model that can be implemented at the early childhood education level. The research approach applied allows identification of patterns of child involvement, its impact on the formation of vegetable consumption habits, the development

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of simple entrepreneurial values, and its contribution to creating a learning environment that supports food security and environmental awareness. Learning methods that emphasize direct experience and children's active participation have a long-term impact on children's character development[10].

Participatory democratic education for early childhood emphasizes a learning paradigm that positions children as active participants in exploration and simple decision-making, in line with their developmental capacities. This concept adapts John Dewey's thinking on democratic education in Nababan[11], which states that the school environment should be a miniature democratic community where children learn through concrete experiences and meaningful participation. In early childhood education, democratic learning not only positions teachers as the sole source of knowledge, but also creates a safe dialogical space for children to ask questions, explore, convey simple ideas, and express their preferences.

Participatory learning, if implemented properly, can improve children's cognitive, affective, and psychomotor skills[12]. The fundamental principles of participatory democracy in early childhood education include: (1) active involvement of children in learning activities through a hands-on approach; (2) joint decision-making on simple matters; (3) developing observation and critical thinking skills in accordance with developmental stages; (4) appreciating the uniqueness and diversity of children's expressions; and (5) fostering a sense of responsibility for the surrounding environment. In the context of this study, the theory of participatory democracy became the philosophical basis for directly involving kindergarten/early childhood education children in gardening activities, from choosing the vegetables to be planted, watering the plants, observing their growth, to enjoying the harvest together.

Democratic participation at this early childhood level not only develops fine and gross motor skills through gardening activities, but also builds simple leadership skills, communication skills, and awareness of the importance of healthy food. Children can express their choices, suggest ways to care for plants, and participate in group decisions so the vegetable cultivation program reflects their interests and needs. The most important aspect of this program is fostering children's interest and enthusiasm for vegetables because they feel a sense of ownership and pride in the vegetables they grow themselves, which psychologically increases their motivation to eat healthy foods. The success of character building through a democratic participatory approach is highly dependent on the quality of implementation, consistency of approach, and responsiveness to each child individually[13].

The experiential learning process and the formation of positive habits through democratic participation align with introducing sustainable entrepreneurship values in early childhood. A more comprehensive concept of experiential learning includes children's reflection on their learning experiences[14]. Eco-sociopreneurship in early childhood education is an integrative approach that introduces environmental awareness (eco), social awareness (socio), and a creative, innovative spirit (entrepreneurship) in a fun learning framework. This concept emerged in response to the need to build

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children's character in a way that not only focuses on individual achievement but also considers the impact on the environment and community. In early childhood, eco-sociopreneurs are young individuals with high curiosity, creativity, and concern for the environment and their friends, while learning to value the results of their work and share them with others. According to Dista and Mandira[15] in their research on entrepreneurship for kids, entrepreneurship programs are inseparable from the realm of knowledge (know how to learn), the realm of skills (know how to do), and the realm of attitude (know how to be).

The holistic integrative curriculum concept emphasizes the overall development of children and integrates various aspects of life, including cognitive, physical, emotional, social, and spiritual aspects[16]. The theory of eco-sociopreneurship is built on three fundamental pillars: (1) sustainable innovation that integrates environmentally friendly technology with social needs; (2) concern for the environment through business practices that minimize ecological footprints; and (3) long-term sustainability that considers intergenerational impacts. In education, eco-sociopreneurship serves as a pedagogical framework that integrates academic learning with character development, environmental awareness, and entrepreneurial skills. To achieve the main objective of increasing early childhood interest in vegetable consumption, the eco-sociopreneurship concept must be adapted to the characteristics and learning needs of early childhood education and care (ECEC) children. Eco-sociopreneurship theory is specifically designed to address the concrete challenge of increasing early childhood interest in and willingness to consume vegetables.

Through eco-sociopreneurship, vegetable gardening integrates experiential learning that helps children build positive connections with vegetables, from planting to consumption. Experience-based learning can have an impact on children's learning outcomes and skill development[17]. Children develop the ability to identify various types of vegetables, understand the plant growth process, and feel satisfaction from their hard work. This approach also fosters an entrepreneurial mindset in early childhood through simple activities such as sharing the harvest with family, selling surplus vegetables to neighbors, or processing vegetables into healthy food products. The triple bottom line applied in this context is: profit (satisfaction and pride from the results of their work), people (sharing with the community and family), and planet (understanding the importance of protecting the environment through environmentally friendly agricultural practices)[18].

Therefore, this study aims to examine the implementation of the design thinking method in designing a program that uses school green spaces to encourage active children's involvement in planting and cultivating vegetables for consumption. Design thinking encompasses knowledge and cognitive dimensions and will be used to enhance creative thinking in problem-solving[19]. Through a collaborative and iterative approach, this study seeks to develop a program model that not only helps meet school food needs but also supports the achievement of national food self-sufficiency targets, as mandated by the Prabowo Subianto administration's policy.

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The urgency of this research is even greater given the government's commitment to developing "national food barns, provincial food barns, district food barns, and village food barns," which require active participation from all levels of society, including the education community. Thus, the results of this research are expected to become a replicable model that contributes significantly to strengthening Indonesia's food security from the grassroots level.

RESEARCH METHODS

This study uses a qualitative approach with design thinking methodology as its main framework. Design thinking was chosen because it is human-centered and iterative, encouraging researchers to understand user needs in depth and develop innovative solutions. This program was implemented as part of the Leadership Project course in the Pre-service Early Childhood Education Teacher Professional Education Program at Satya Wacana Christian University. The research was conducted at Kartika Kindergarten in Salatiga, Central Java, involving multiple stakeholders, namely 17 children as the main participants with an age range of 5-6 years, 3 teachers as learning facilitators, the principal as the institutional policy maker, and 5 parents for their perspective on their children's eating behavior at home. This location was chosen based on the availability of unused land and the problem of children's reluctance to eat vegetables.

Within the Design Thinking framework, this research followed the following five stages.

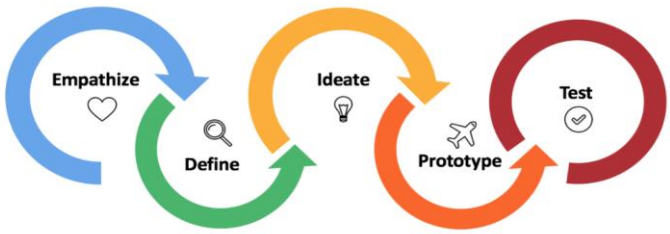


Figure 1. Design Thinking Stage

Design Thinking Bootcamp Bootleg is a collection of methods, principles, and mindsets used to solve problems through a creative, human-centered approach (human-centered design). This theory emphasizes that good innovation arises from a deep understanding of user needs, collaborative idea exploration, and rapid experimentation through prototypes. According to Plattner, Meinel, & Leifer in their publication Design Thinking: Understand, Improve, and Apply, this approach helps individuals and teams "think like designers" to produce solutions that are desired by users, technically feasible, and economically valuable[20].

Table 1. Five Stages of Design Thinking (Bootcamp Bootleg – Stanford d.school version)

Phase	Explanation	Objective
Empathize	Exploring and understanding user needs, emotions, and motivations through interviews, observation, or immersion.	Identifying problems from the user's perspective.
Define	Formulate a problem statement based on empathy findings to focus on solutions.	Formulate clear and meaningful design challenges.
Ideate	Generate as many creative ideas as possible in the early stages, without restrictions.	Discovering various innovative solutions.
Prototype	Transforming ideas into tangible forms (sketches, models, simulations, or mockups).	Testing ideas quickly and cheaply.

[20] H. Plattner, C. Meinel & L. Leifer. (Eds.) Design Thinking: Understand – Improve – Apply. 2010. Springer-Verlag.

Test	Testing prototypes with users to get direct feedback.	Refining solutions based on actual user feedback.

Bootleg Bootcamp Key Principles:

1. Focus on human values; be oriented towards human needs.
2. Show, don't tell; communicate ideas through visuals and experiences.
3. Bias toward action; it's better to try than to analyze for too long.
4. Radical collaboration: involve various disciplines and perspectives.
5. Be mindful of process; be aware of each stage and its objectives.
6. Prototype to think; use prototypes not only for testing, but also for thinking.

Phase 1: Empathize (Understanding Users)

The Empathize stage emphasizes understanding what users like and what the world needs, drawing insights from human-centered research methods[21]. The empathize phase aims to build a deep understanding of the needs, motivations, and challenges faced by all stakeholders in the context of vegetable consumption and the use of school green spaces. At this stage, data collection methods include in-depth, semi-structured interviews with three main categories of informants: the principal (institutional vision and nutrition policy), teachers (experience managing meal times and children's behavior), and parents (children's eating patterns at home). In addition, researchers conducted participatory observation of children's eating behaviors and the social dynamics that influence food preferences, and physically mapped vacant school land to identify potential uses.

Phase 2: Define (Defining the Problem)

Based on input from the empathize phase, researchers synthesize data to formulate specific, feasible, human-centered problems. The define phase uses affinity mapping techniques to categorize findings and identify significant patterns. The define phase produces user personas, points of view, and pain points[22]. At this stage, design ideas are generated through brainstorming to be used as solutions to the problems identified[23]. The interview transcripts were analyzed using thematic analysis to identify main themes related to factors influencing children's resistance to vegetables, parents' expectations and concerns about their children's nutrition, resource limitations and strategies implemented by schools, and the potential use of vacant land for learning activities.

Phase 3: Ideate (Generating Ideas)

The ideate phase involves a collaborative brainstorming process to generate various creative alternative solutions. The Ideate stage allows designers to explore various possibilities[24]. Ideation sessions involved a team of researchers, teachers, and school principals to ensure the feasibility and relevance of the ideas generated, resulting in the Mak Tani Program. *Mak Tani* is an acronym for *Mari Kita Tanam dan Nikmati* (Let's Plant and Enjoy). In Indonesian culture, "**Mak**" refers to a mother or a Javanese woman, while "Tani" refers to farming or agricultural cultivation.

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[24] C. Weiss. Transforming The Classroom With Design Thinking. Proceedings - The Twelfth International Symposium GRID 2024. https://doi.org/10.24867/GRID-2024-p3

Phase 4: Prototype (Creating a Prototype)

The prototype phase involves developing an initial version of the Mak Tani program that can be implemented and tested on a limited scale. This prototype develops the 5M Learning Design, which integrates gardening activities with the kindergarten curriculum through five systematic stages:



Figure 2. 5M Learning Design

1. Planting Seeds: Children are introduced to various types of vegetable seeds, learn to identify seed characteristics, prepare planting media, and carry out planting activities using the appropriate techniques. This stage covers the basic needs of plants and foundational ecosystem concepts.
2. Caring for Vegetables: Children are responsible for plant maintenance activities through scheduled watering, organic fertilization, weeding, and growth monitoring. These activities develop responsibility, consistency, and scientific observation of plant development.
3. Harvesting Vegetables: Children learn to recognize signs of vegetable ripeness, proper harvesting techniques, and the optimal time to harvest. This stage provides direct experience of the fruits of hard work and develops an appreciation for the food production process.
4. Processing Vegetables: Children are involved in simple processing activities such as washing, cutting under supervision, and preparing vegetables for cooking. This stage introduces food safety, hygiene, and basic culinary skills.
5. Consuming Vegetables: Children participate in eating their own harvest together, accompanied by reflections on the taste, texture, and nutritional value of the vegetables. This stage culminates the program, connecting the process to the ultimate goal of changing consumption behavior.

Infrastructure Preparation: Designing the layout of a mini garden on vacant school land, including plot division for each children's group, a simple irrigation system, and a composting area to support learning about the nutrient cycle. The prototype that has been made is then tested with users to find out whether the design is working well or not, and will receive feedback for future product development[25].

Phase 5: Testing

The Testing phase not only improves language proficiency but also fosters ownership and flexibility[26]. The testing phase involves implementing the Mak Tani program with 17 participating children over a specific period, accompanied by systematic monitoring and evaluation to measure the program's effectiveness in achieving its objectives. Pilot Program Implementation: Implementation of the Mak Tani program over one planting cycle (2-3 months), with systematic documentation of children's participation, crop development, and changes in vegetable consumption behavior. Monitoring and Evaluation: Qualitative data collection through observation of children's participation in each activity, photo and video documentation of the learning process, and follow-up interviews with teachers and parents about changes in children's behavior. Based on the testing results, the program design was improved to optimize its impact and sustainability. Input from various stakeholders was integrated to develop the final version of the program, which was ready for implementation on a larger scale.

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Research instruments included semi-structured interview guidelines, observation sheets, visual documentation, and children participation assessment rubrics. Data analysis used a thematic analysis approach[27] for qualitative data, with triangulation of data sources to ensure the validity of the findings.

RESEARCH RESULTS AND DISCUSSION

Implementation of Design Thinking in the Development of the Mak Tani Program

The implementation of the "Mak Tani" (Let's Plant and Enjoy) program at Kartika Kindergarten in Salatiga using a design thinking approach documents the design process and pilot implementation of the 5M framework, and identifies promising qualitative evidence and directions for more rigorous future testing to develop innovative solutions to the problem of children's engagement in vegetable consumption. As a comprehensive educational innovation, this program goes beyond conventional gardening activities and has been transformed into an interactive learning space that encourages children to actively participate in the entire vegetable cultivation cycle, aligned with their cognitive developmental stages.

The empathize phase emphasizes that proactively engaging with and responding to the diverse and ambiguous needs of stakeholders can increase opportunities for innovation and new ways of thinking[28]. Based on the research results, the empathize phase seeks to understand the root causes of problems in democratic education. In this phase, it was found that children's resistance to eating vegetables was not merely a matter of taste preference, but rather a complex issue involving a lack of familiarity, a lack of direct involvement in the production process, and a lack of positive experiences with vegetables. These findings confirm the problems faced by the parents of Kartika Salatiga Kindergarten children in getting children to consume vegetables, which was the main trigger for developing the Mak Tani program. Based on interviews with the principal, the study found vacant land that had not been optimized for learning activities, while teachers reported systematic difficulties in encouraging children to eat vegetables during school meal times. In addition, participatory observation showed that children tended to avoid or set aside vegetables from their plates, especially green vegetables such as mustard greens and spinach. This behavior pattern was confirmed by parents who also experienced similar challenges at home.

From the perspective of participatory democratic education as proposed by Dewey in Nababan[29], this empathized phase reflects the importance of understanding children as active individuals who need real and meaningful experiences to build connections with learning objects. The school environment needs to be transformed into a miniature democratic community where children learn through direct involvement, not just passively receiving instructions about the importance of eating vegetables. Based on the school's physical map, we identified potential areas to develop into mini gardens with adequate water access and sufficient sunlight. Fertile soil conditions

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and a location easily accessible from the classroom support implementing a gardening program that positions children as the main actors in learning.

The deep understanding of children's physical conditions and needs gained in the empathize phase is then synthesized in the define phase to formulate a specific, actionable problem statement. This phase analyzes and understands the results obtained in the empathize stage[30]. The transformation of the school environment, identified as a potential space for democratic learning, is then operationalized through thematic analysis that reveals the root causes of children's vegetable consumption behavior. Based on the interview data, several interrelated main themes emerged. First, children reject vegetables because they have no direct experience in the production process, so they do not appreciate the value and effort required to produce food. Second, conventional learning methods that rely solely on verbal and didactic instruction are ineffective at changing early childhood eating behavior. Third, a gap exists between theoretical learning about nutrition and the daily eating practices children experience.

Based on the perspective formulated as the basis for developing the Solution, namely "Kartika Salatiga kindergarten children need direct and enjoyable experiences in learning about vegetables because they tend to reject unfamiliar foods and do not actively involve them in the process." This statement aligns with the fundamental principles of participatory democracy, which emphasize children's active involvement in learning through a hands-on approach, where they have a safe space to ask questions, explore, and express their preferences. The solution orientation is an approach that focuses on solution building rather than problem solving[31]. Thus, this solution shifts the perspective from "children don't want to eat vegetables" (blame-oriented) to "children need experiences that build emotional and cognitive connections with vegetables" (solution-oriented), reflecting a human-centered design paradigm that places user needs at the center of solution development.

Furthermore, collaborative brainstorming sessions with the research team, teachers, and school principals led to the "Mak Tani" program, which integrates three key elements: experiential learning, environmental education, and food literacy. Environmental education practices support community-focused participation by actively involving children through participatory approaches and hands-on experiences, incorporating real action as an integral part of the education program, emphasizing the development of lifelong cognitive skills, and providing ongoing opportunities for participants to engage in meaningful social interactions[32]. The concept of "from seed to plate" was chosen because it connects children to the entire vegetable production cycle, building a sense of ownership and emotional connection that is important for changing consumption behavior. The Mak Tani program's innovation lies in systematically integrating gardening activities with the goal of increasing vegetable consumption through the lens of eco-sociopreneurship. The program integrates three fundamental pillars: (1) eco dimension (environmental awareness) through learning about

[30] D. Haryuda, M. Asfi & R. Fahrudin. Perancangan Ui/Ux Menggunakan Metode Design Thinking Berbasis Web Pada Laportea Company. Jurnal Ilmiah Teknologi Infomasi Terapan, 8(1), 111–117. 2021. https://doi.org/10.33197/jitter.vol8.iss1.2021.730

[31] C. Iveson. Solution-focused brief therapy. Advances in Psychiatric Treatment, 8(2), 149–156. 2002. https://doi.org/10.1192/apt.8.2.149

[32] N. M. Ardoin, A. W. Bowers & E. Gaillard. A systematic mixed studies review of civic engagement outcomes in environmental education. Environmental Education Research, 29(1), 1-26. 2023. https://doi.org/10.1080/13504622.2022.2135688

organic farming practices and natural resource management; (2) socio dimension (social awareness) through harvest sharing activities and collaboration in groups; and (3) entrepreneurship dimension (creative innovative spirit) through the development of curiosity, creativity in problem solving, and appreciation for work results.

In early childhood, eco-sociopreneurs are young individuals with high curiosity, creativity, and concern for the environment and their peers, while learning to appreciate the fruits of their labor and share them with others. The Mak Tani program embodies this concept by enabling children to not only learn how to plant, care for, and harvest vegetables, but also to understand their nutritional value, health benefits, and importance in a balanced diet. The 5M learning design of the Mak Tani program, namely planting seeds, caring for vegetables, harvesting vegetables, processing vegetables, and consuming vegetables, is an implementation of the triple bottom line concept adapted to the context of early childhood education. This learning model integrates three dimensions of sustainability in a balanced manner: the profit dimension is realized through children's satisfaction and pride in their own work; the people dimension is reflected in the activity of sharing the harvest with the community and family, which fosters social values and caring; while the planet dimension is practiced through children's understanding of the importance of preserving the environment by applying environmentally friendly farming methods.

Through direct experience in all stages of the 5M process, children not only learn cognitively, but also develop a holistic awareness of the interrelationship between human activities, social welfare, and environmental sustainability from an early age. The triple bottom line can be understood as an extension of sustainable development, encompassing elements such as social justice, economic foundations, and environmental responsibility. To summarize the essence of the triple bottom line construct, Elkington proposes that the focus of this concept centers on three words: people, planet, and profit[33]. This integrative approach ensures that the program not only solves problems related to vegetable consumption but also builds holistic and sustainable character.

Pedagogical Implications of the 5M Learning Design and Its Impact on Children's Behavior Change

After going through the above stages, the prototype phase was implemented through the 5M learning design developed in the Mak Tani program, which showed a coherent and progressive structure, where each stage built a foundation for the next stage while implementing the fundamental principles of participatory democracy, such as active involvement, joint decision-making, development of observation skills, appreciation of the uniqueness of children's expressions, and the formation of a sense of responsibility for the environment. In the first stage, the seed planting stage began with preparation that involved introducing tools and materials to children through stories and short videos about the benefits of vegetables. This narrative approach effectively built initial enthusiasm and understanding among children, aligning with the principle of learning through concrete experiences emphasized in democratic education. The preparation of the planting media, which involves loosening the soil, forming beds, mixing organic fertilizer, and installing plastic mulch, is carried out by involving children in observation and discussion about the function of each

[33] T. H. M. Pereira & H. C. Martins. People, planet, and profit: a bibliometric analysis of triple bottom line theory. J. Mgmt. & Sustainability, 11, 64. 2021. https://doi.org/10.5539/jms.v11n1p64

step. This process develops observation and critical thinking skills in accordance with the children's stage of development, one of the principles of participatory democratic education.



Figure 3. Visual of the 5M MAK TANI Program

The seed selection activity positions children not merely as passive recipients of knowledge but as active agents who help determine the direction, methods, and goals of their learning, while collectively reflecting on basic principles of decision-making. Children learn to identify healthy seedlings with at least four to five true leaves, developing fundamental scientific observation skills. Carefully removing seedlings from polybags builds fine motor skills while instilling caution and respect for living organisms.

In addition, children are given the freedom to express themselves by creating personalized name tags for their plants, an effective strategy for fostering a sense of ownership until harvest. Psychologically, this sense of ownership strengthens intrinsic motivation to eat vegetables they grew themselves, aligning with the program's primary objective of reducing resistance to vegetable consumption.

The next stage is plant maintenance, structured around a schedule that promotes consistency and responsibility among children. This stage is particularly important in shaping eco-sociopreneurs' character. Children water the plants twice a week using lightweight watering tools appropriate to their motor abilities. This activity is not merely routine; it offers a learning moment about the basic needs of living beings and cause-and-effect relationships, while also fostering leadership traits through individual responsibility for plant care. In addition to watering, children are introduced to applying NPK fertilizer every two weeks under close supervision by accompanying teachers, teaching concepts of plant nutrition and the importance of periodic care. Although children do not mix fertilizers independently for safety reasons, their involvement in the application process provides meaningful exposure to responsible agricultural practices, reflecting the “eco” dimension of eco-sociopreneurship. Furthermore, regularly observing plant growth builds observational skills and critical thinking appropriate to children’s developmental stages, in line with the principles of participatory democratic education. Children learn to document changes and identify growth patterns, fostering anticipation for subsequent stages. This process also nurtures awareness of the importance of patience and consistency in achieving goals, key entrepreneurial values that should be cultivated from an early age.

The harvesting stage represents the culmination of the planting process, offering children a tangible reward for their efforts and embodying the idea that gain comes through satisfaction and pride in their work. Teachers facilitate learning about vegetable maturity indicators by observing size and color, helping children develop identification skills and decision-making abilities integral to an entrepreneurial mindset. Entrepreneurial thinking and strong motivation are essential for initiating

successful ventures[34]. Demonstrations of proper harvesting techniques teach children to respect produce and avoid damaging plants that are still growing, reinforcing environmental stewardship. Children are encouraged to use their hands to develop motor skills, alongside guided, safe use of small scissors under teacher supervision. Harvesting activities conducted in an orderly, sequential manner instill discipline and patience. At this stage, collecting the harvest in shared containers and counting the vegetables provide meaningful contextual mathematics experiences. Cleaning soil from harvested vegetables introduces hygiene concepts and helps children understand that vegetables seen in markets or on dining plates undergo a lengthy preparation process. This appreciation of the production process forms a foundation for children's willingness to consume vegetables.

Following harvesting, children proceed to the vegetable processing stage, which includes washing mustard greens and other ingredients with clean water and cutting vegetables through a graduated assignment of responsibilities based on children's abilities. Teachers assist with cutting harder stems. This distribution of roles teaches safety awareness, recognition of limitations, and collaboration while ensuring active participation. Other groups prepare seasonings through multisensory learning activities such as peeling, crushing, roasting ginger, and grinding garlic with a mortar and pestle, introducing basic culinary skills and expanding vocabulary related to the characteristics of spices. Multisensory learning engages multiple senses (visual, auditory, kinesthetic, and tactile) to enhance information processing and retention[35]. Teachers employ descriptive language that stimulates curiosity, a key characteristic of young eco-sociopreneurs. The cooking process, conducted by teachers with children observing, provides insight into transforming raw ingredients into ready-to-eat food, fostering an understanding of value addition in a simplified context.

In the final stage, consumption, children experience the outcomes of their efforts over several weeks. Handwashing routines and shared meals are designed using a noncoercive approach, reflecting principles of creating a safe, dialogic space for children within democratic education. Children take appropriate portions of stir-fried mustard greens into their own bowls, allowing control over serving size and avoiding pressure that could lead to resistance. Teachers facilitate sensory exploration by asking open-ended questions that encourage reflection and help children articulate their sensory experiences. Encouraging children to "try even just a little" can build emotional engagement and a sense of ownership long before the plant stage. Sensory experiences provide visual, auditory, tactile, and olfactory stimuli, which have been shown to significantly correlate with children's behavioral experiences[36].

The Mak Tani program was implemented over a single planting cycle (2–3 months), which was deemed sufficient to observe significant behavioral changes among children. Systematic monitoring revealed increased participation at each stage, with consistent enthusiasm from start to finish, indicating the program's success in creating enjoyable, meaningful learning experiences.

[34] S. Shetty G, V. Baliga & M. Thomas Gil. Impact of entrepreneurial mindset and motivation on business performance: deciphering the effects of entrepreneurship development program (EDPs) on trainees. Cogent Business & Management, 11(1), 2314733. 2024. https://doi.org/10.1080/23311975.2024.2314733

[35] M. Y. Omar & M. S. A. Saleh. The Role of Multi-sensory Learning Activities on Iraqi Preparatory School Pupils' Communication. Journal Of Language Studies, 8(10), 116–135. 2024. https://doi.org/10.25130/Lang.8.10.6

[36] J. Xu, L. Chen, T. Liu, T. Wang, M. Li & Z. Wu. Multi-Sensory Experience and Preferences for Student in an Urban Forest Park: A Case Study of Maofeng Mountain Forest Park in Guangzhou, China. Forests, 13(9), 1435. 2022. https://doi.org/10.3390/f13091435

Observations showed that children who were initially reluctant to touch soil and vegetable seedlings gradually became more confident and even enthusiastic about gardening activities. This transformation demonstrates the program's effectiveness in fostering deep emotional and cognitive connections between children and vegetables through direct involvement in the entire production process, consistent with the applied eco-sociopreneurship framework.

Furthermore, follow-up interviews with teachers revealed significant behavioral changes, particularly in children's willingness to try vegetables they had harvested themselves. Several children who previously rejected green vegetables entirely began to taste them, albeit in small portions. Although seemingly modest, this change represents a substantial achievement in addressing challenges faced by parents related to children's reluctance to consume vegetables.

Parental feedback provided additional perspectives on the transfer of learning from school to home. Several parents reported that their children enthusiastically shared their experiences of planting and caring for vegetables at school, indicating strong emotional engagement. Some parents also observed increased openness among children toward trying vegetables at home. These findings suggest that the sense of ownership and pride cultivated through the Mak Tani program reshaped children's broader perceptions of vegetables.

The 5M learning design can achieve multiple learning outcomes simultaneously, reflecting the holistic educational character of the Mak Tani program. From a behavioral perspective, the program increased children's willingness to eat vegetables they grew themselves, driven by ownership and intrinsic motivation fostered through direct engagement in cultivation. Cognitively, children gained an understanding of plant growth cycles, the needs of living organisms, cause-and-effect relationships, and vegetable nutrition through concrete, real-world experiences rather than abstract theory. Character values such as responsibility, patience, cooperation, discipline, environmental awareness, and creativity were also cultivated throughout the process. Additionally, planting and caring for plants enhanced both fine and gross motor skills essential to child development. Fine motor skill development supports children's independence in daily activities[37].

From a social-emotional perspective, group activities and shared meals strengthened communication, empathy, and shared experiences, fostering social awareness and collaborative spirit. Environmental consciousness emerged as children learned the importance of protecting soil, water, and ecosystems in food production. At the same time, entrepreneurial thinking began to take shape through activities such as counting harvest yields, sharing produce with the surrounding community, and appreciating work processes. The interconnected 5M structure made each stage meaningful and created a cohesive learning trajectory from planting to consumption (seed to plate), helping children understand that success results from gradual, sustained effort.

CONCLUSION

The implementation of the Mak Tani ("Let's Plant and Enjoy") program at Kartika Kindergarten, Salatiga, through a design thinking approach can be used as a learning model that integrates children's democratic participation with the development of entrepreneurial ecotourism

[37] F. L. Setianingsih & L. I. Rocmah. Memajukan Keterampilan Motorik Halus pada Anak Usia Dini Melalui Intervensi Buku Aktif di Indonesia. Jurnal Pendidikan Anak Usia Dini, 1(4), 15. 2024. https://doi.org/10.47134/paud.v1i4.706

characters in the context of sustainable food security. The 5M learning design (planting seeds, caring for vegetables, harvesting vegetables, processing vegetables, and consuming vegetables) successfully addressed the concrete issue of early childhood resistance to vegetable consumption by fostering emotional and cognitive connections through direct engagement in the entire food production cycle. This program not only improved vegetable consumption behavior but also cultivated a holistic understanding of the triple bottom line (profit, people, and planet), adapted to young children's developmental capacities, while nurturing sustainable entrepreneurial values such as responsibility, patience, creativity, and environmental awareness.

The success of the Mak Tani program contributes significantly to developing a sustainable food security education model that can be replicated at the early childhood education level. Through the five stages of design thinking- empathize, define, ideate, prototype, and test- this study produced a participatory learning framework that positions children as active agents of change within the food system, aligning with the Indonesian government's commitment to achieving national food self-sufficiency. Future research may explore implementing similar programs on a broader scale, examine long-term impacts on vegetable consumption habits into later childhood, and develop more comprehensive eco-sociopreneurship curriculum integration models in early childhood education by incorporating simple economic dimensions, such as selling surplus harvests to the school community.

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