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Harvesting benefits: Exploring the impacts and barriers of school garden programs

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A R T I C L E I N F O

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A B S T R A C T

This study investigated the benefits and challenges of implementing school garden programs in elementary schools, focusing on their impact on students' learning, environmental awareness, health, and social development. Using a descriptive phenomenological approach, the experiences of fifteen teachers, staff, and students were explored through purposive sampling and open-ended questionnaires. Thematic analysis revealed four major benefit areas: academic and experiential learning, environmental awareness and sustainability, health and well-being, and social development and community building. Simultaneously, schools faced challenges related to resource constraints, time limitations, garden maintenance, and stakeholder engagement. Quantitative data highlighted the prevalence of each theme, indicating that school gardens foster hands-on learning, responsible environmental behavior, healthier eating habits, and teamwork, while challenges require careful planning, collaboration, and creative solutions. The findings underscore the importance of integrating school gardens into the curriculum and promoting active involvement of teachers, parents, and community members to maximize their educational and social impact.

JEL Classification: I21

Introduction

School gardens have been shown to positively influence students' knowledge, attitudes, and behaviors (Amiri, Geravandi, & Rostami, 2021; Chan, Tan, & Gong, 2022). They provide a meaningful context for science education by stimulating students' interest and motivation to learn and by enabling hands-on engagement with ecological and nutritional concepts (Fägerstam, 2018; Kuo et al., 2018). Through experiential learning, students connect theoretical knowledge to real-world practice, strengthening their understanding of environmental systems and developing observational and inquiry skills (Christodoulou & Korfiatis, 2019; Eugenio-Gozalbo, Aragón, & Ortega-Cubero, 2020).

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Recent research continues to demonstrate the academic and behavioral benefits of school garden programs. Systematic reviews indicate that garden-based interventions improve students' nutritional knowledge, attitudes toward fruits and vegetables, and, in some cases, dietary behaviors (Chan, Tan, & Gong, 2022; Ohly et al., 2016). Emerging experimental evidence also suggests that school garden programs can contribute to improvements in academic performance, including reading achievement (Davis et al., 2023). In addition, quasi-experimental and mixed-methods studies report gains in students' environmental knowledge, positive environmental attitudes, and connectedness to nature following participation in school gardening activities (Amiri, Geravandi, & Rostami, 2021; Klespies & Dierkes, 2020).

Beyond academic outcomes, school gardens create opportunities for outdoor learning and physical activity and have been associated with improvements in wellbeing and classroom engagement (Howarth et al., 2020; Kuo et al., 2018). Recent reviews further highlight their role in supporting social-emotional development, student engagement, and sustainability behaviors, although implementation quality and program duration influence outcomes (Walshe, Evans, & Law, 2024).

Existing research consistently demonstrates that school garden programs enhance students' academic knowledge, environmental awareness, nutritional attitudes, and even certain behavioral outcomes, largely through experiential, hands-on learning. Studies have focused on measuring improvements in science learning, dietary preferences, environmental attitudes, and, more recently, academic performance and well-being.

Despite these well-documented benefits, there remains a notable gap in the literature on the long-term sustainability and contextual effectiveness of such programs, particularly across diverse educational settings. Many studies rely on short-term interventions or controlled environments, offering limited insight into how school gardens function over extended periods or within resource-constrained schools.

Additionally, there is insufficient exploration of how factors such as program implementation quality, teacher preparedness, cultural context, and community involvement influence outcomes. As a result, further research is needed to examine these dimensions to better understand how school garden programs can be effectively sustained and adapted to maximize their impact in varied real-world educational contexts.

This study explored the benefits and challenges of implementing a school garden as an educational tool. As outlined in the introduction, schools are increasingly seeking innovative, experiential learning approaches to enhance students' academic outcomes, health awareness, and environmental responsibility.

Review of related literature and studies

This review examines existing research on the benefits and challenges of school garden programs, focusing on learning outcomes, environmental awareness, health promotion, and social development. It also highlights implementation challenges, with particular emphasis on schools in the Marcos District.

Benefits of school garden programs

School garden programs have been shown to positively influence students' dietary habits and nutrition knowledge. Participation in gardening activities encourages children to try a wider variety of fruits and vegetables and promotes healthier eating behaviors that often extend to their families (Carney et al., 2019; Ohly et al., 2017). These programs provide practical, hands-on learning experiences that complement classroom instruction, particularly in subjects such as science, literacy, and nutrition, helping students connect theoretical knowledge to real-world applications (Williams & Dixon, 2018; Haughey et al., 2024).

In addition to academic benefits, school gardens foster social and emotional development. Students gain confidence, self-esteem, resilience, and teamwork skills through collaborative gardening projects, while also strengthening connections with teachers, peers, and the wider community (Blair, 2019; Carney et al., 2019). These programs encourage cooperation and responsibility, helping children develop a sense of ownership and pride in their work while promoting a supportive school environment.

Finally, school gardens enhance environmental awareness and overall well-being. Students develop a greater understanding of sustainability, ecosystems, and resource management, fostering long-term environmental stewardship (Haughey et al., 2024). Exposure to natural settings in gardens has also been linked to reduced stress, improved mood, and increased physical activity, contributing to both mental and physical health (Williams & Dixon, 2018; Blair, 2019). Overall, school garden programs represent a multifaceted approach that simultaneously supports healthy lifestyles, academic growth, social-emotional development, environmental literacy, and well-being.

Learning and academic achievement

School gardens function as living laboratories where students apply academic concepts in authentic, real-world contexts. Research indicates that garden-based learning enhances students' understanding of science concepts, particularly in biology, ecology, environmental systems, and sustainability principles. Through direct interaction with plant life cycles, soil systems, and ecosystems, students develop deeper conceptual comprehension and improved inquiry skills. Recent studies show that hands-on garden experiences increase engagement in science learning and support inquiry-based instructional approaches, leading to stronger academic performance and motivation (Davis et al., 2023; Chan et al., 2022).

In addition to science education, school gardens promote cross-curricular integration. Garden activities naturally incorporate mathematics through measuring growth, budgeting, and data recording; language arts through reflective journaling and descriptive writing; and health and nutrition education through food literacy lessons. Contemporary research suggests that when garden programs are intentionally

aligned with classroom instruction, students demonstrate improved engagement and measurable academic gains (Walshe, Evans, & Law, 2024).

Beyond academic achievement, school gardens also foster important social skills among students. Working collaboratively in the garden fosters teamwork, emotional and behavioral skills, communication, and problem-solving, while shared responsibilities such as planting, watering, and crop maintenance cultivate a sense of accountability and cooperation. Students also report increased self-efficacy, confidence, and patience, as they see the tangible results of their efforts over time. Furthermore, exposure to nature and hands-on gardening experiences has been linked to reduced stress, improved well-being, and stronger environmental stewardship, highlighting the holistic benefits of garden programs that extend beyond classroom learning (Aragón et al., 2024; Chan et al., 2022).

Environmental awareness and stewardship

School gardens play a significant role in promoting environmental awareness and fostering stewardship values among students. Participation in gardening activities increases students' ecological knowledge and understanding of biodiversity, sustainability, and natural resource cycles. Empirical evidence indicates that students engaged in school garden programs develop stronger pro-environmental attitudes and demonstrate higher levels of environmental responsibility compared to non-participants (Amiri et al., 2021; Klespies & Dierkes, 2020).

Regular interaction with garden spaces also strengthens students' connection to nature, contributing to a sense of place and a long-term commitment to the environment. Such experiences are associated with the development of environmental citizenship and a willingness to engage in sustainable practices within and beyond the school setting.

Moreover, school gardens provide students with opportunities to observe and respond to real-world environmental challenges, such as plant health, soil quality, and seasonal changes, which reinforces critical thinking and problem-solving skills in ecological contexts. These experiences encourage students to adopt sustainable behaviors in their daily lives, including composting, conserving water, and using natural resources responsibly. Research also suggests that students who actively participate in school gardens are more likely to influence their families and communities toward environmentally responsible practices, extending the impact of garden programs beyond the classroom and fostering a culture of sustainability (Walshe, Evans, & Law, 2024; Davis et al., 2023).

Health, nutrition, and well-being

School gardens contribute positively to students' health outcomes by promoting nutrition knowledge, healthy eating behaviors, and physical activity. Recent systematic reviews report that garden-based programs improve students' understanding of healthy diets and increase their willingness to consume fruits and vegetables, particularly when gardening is combined with structured nutrition education (Chan et al., 2022; Wells et al., 2022). Through active involvement in growing food, students become more familiar with fresh produce, which can influence long-term dietary preferences.

Moreover, gardening activities encourage moderate physical activity and outdoor engagement, both of which are linked to improved psychological well-being. Exposure to green spaces has been associated with reduced stress, enhanced mood, and greater overall school engagement (Holloway et al., 2023).

In addition to nutrition and physical activity benefits, school gardens also support social and emotional well-being, which indirectly contributes to healthier lifestyles. Participating in garden activities provides students with opportunities for collaboration, responsibility, and problem-solving, fostering a sense of accomplishment and self-efficacy. Studies indicate that these psychosocial benefits, combined with hands-on learning about food and health, can reinforce positive dietary behaviors and encourage students to adopt lifelong healthy habits. Furthermore, school gardens create a supportive and engaging learning environment in which students develop mindfulness, reduce screen time, and experience the restorative effects of nature, thereby amplifying the overall impact on both mental and physical health (Amiri et al., 2021; Davis et al., 2023).

Social skills, confidence, and community engagement

Beyond academic and health benefits, school gardens provide meaningful opportunities for social development and community building. Collaborative gardening tasks encourage teamwork, communication, and shared responsibility. Studies suggest that participation in garden programs enhances students' self-confidence, leadership skills, and sense of accomplishment, particularly when students are involved in decision-making and project management (Walshe et al., 2024).

Additionally, school gardens often strengthen connections between schools, families, and local communities. Community volunteers, parents, and local agricultural partners may contribute to garden maintenance and educational activities, fostering stronger social networks and reinforcing school pride. Such partnerships support the sustainability of garden programs and deepen their educational impact.

Furthermore, school gardens create a safe and inclusive space where students from diverse backgrounds can interact, share ideas, and develop interpersonal skills. Engaging in group projects and problem-solving tasks in the garden fosters empathy, cooperation, and conflict-resolution skills that are transferable to the classroom and social settings. Research also indicates that students involved in garden programs often take on mentoring roles, guiding younger peers or new participants, thereby strengthening leadership skills and building a sense of community ownership. These social experiences not only enhance personal development but also promote long-term civic engagement, as students learn the value of contributing to communal efforts and sustaining shared resources (Chan et al., 2022; Aragón et al., 2024).

Challenges in implementing school garden programs

Implementing school garden programs presents several challenges, beginning with resource and funding constraints. Adequate financial support is essential for acquiring tools, seeds, soil, irrigation systems, and infrastructure, yet many schools—particularly those in low-income areas—struggle to secure dedicated budgets for gardening initiatives. Limited access to quality gardening materials can further constrain program effectiveness, making consistent and sustainable implementation difficult (Walshe, Evans, & Law, 2024).

Another significant challenge involves time constraints and curriculum integration. Teachers often face competing academic priorities and limited instructional time, making it difficult to incorporate garden-based activities into an already full curriculum. Seasonal cycles and school calendars can also create scheduling conflicts, complicating regular engagement with garden projects. Research highlights that aligning garden activities with curriculum objectives and classroom instruction requires careful planning and support to ensure meaningful learning outcomes (Chan, Tan, & Gong, 2022).

Maintenance and sustainability are additional obstacles. Gardens require ongoing care, including planting, watering, weeding, and harvesting, which often extends beyond teachers' regular responsibilities. Many programs rely on parents and community volunteers to assist with maintenance; however, volunteer availability can be inconsistent, jeopardizing the long-term viability of school gardens (Holloway et al., 2023). Establishing long-term maintenance plans and shared responsibility structures is therefore critical to prevent garden decline and ensure continued educational benefit.

Finally, stakeholder support and knowledge can influence program success. Administrative buy-in is essential, as school leaders who lack awareness or prioritize other initiatives may not support garden integration. Similarly, effective use of gardens in learning depends on teacher confidence and professional training, which are often limited in practice. Evidence suggests that investing in teacher training and fostering positive attitudes among school staff and administrators significantly enhances program sustainability and educational impact (Amiri, Geravandi, & Rostami, 2021; Walshe et al., 2024).

School garden programs offer substantial benefits, enhancing academic learning, environmental awareness, healthy behaviors, social skills, and community engagement. They provide hands-on, experiential learning opportunities that foster understanding of science, nutrition knowledge, teamwork, and school pride. However, challenges such as limited funding, time constraints, maintenance demands, and inconsistent stakeholder support can hinder implementation and sustainability. With adequate planning, resources, and community involvement, school gardens can serve as long-term, holistic tools for education and student well-being.

Statement of the problem

The purpose of this study is to examine the benefits and challenges associated with implementing school garden programs in the Marcos School District. Specifically, the study aims to address the following research questions:

1. What benefits do school garden programs provide to students and the school community in terms of learning, environmental awareness, health, and social development?

2. What are the major challenges faced by schools in implementing school garden programs in terms of resources, time, maintenance, and stakeholder support?

Methodology

This chapter presents the research design and sources of data, including the study locale, population, and sampling; the data-gathering instrument; and data analysis, along with its ethical standards.

Research design

This study employed a descriptive phenomenological approach, which is appropriate for capturing the lived experiences of elementary teachers involved in school garden programs. Phenomenology enables an in-depth exploration of participants' subjective experiences, facilitating the identification of common themes regarding the benefits and challenges of implementing garden programs (Creswell, 2013). This approach is particularly suited to understanding the emotional, social, and operational aspects of integrating gardens into school practices.

Locale of the study

The study was conducted in the Municipality of Marcos, providing relevant context for exploring the implementation of school garden programs in elementary schools. The local setting is significant as it reflects the socio-economic and educational realities that may influence the success and sustainability of garden initiatives.

Population and sampling

A total of 15 elementary teachers from various schools in the Municipality of Marcos were purposively selected for this study. This sample size aligns with phenomenological research, which prioritizes depth of understanding over generalizability (Van Manen, 2016). Participants were selected for their direct involvement in school garden programs, ensuring the study captures rich insights into both the practical benefits and challenges of these initiatives.

Data Gathering instrument

Data were collected via an online interview questionnaire consisting of open-ended questions designed to elicit detailed responses about teachers' experiences with school gardens. The instrument was developed in alignment with the study's objectives and validated through expert review to ensure clarity, relevance, and the ability to capture rich qualitative data (Kvale & Brinkmann, 2015). The questions covered areas such as academic outcomes, environmental education, health promotion, social development, and implementation challenges.

Data gathering procedure

Data were collected via online questionnaires administered through Google Forms. While online data collection can limit the richness of responses compared to face-to-face interviews, several strategies were implemented to mitigate this limitation. Follow-up emails were sent to clarify ambiguous responses, and participants were encouraged to provide detailed explanations in their answers. Additionally, participants were given the option to schedule follow-up interviews via video conferencing if further elaboration was necessary.

The online questionnaire was designed to elicit detailed and reflective responses and was piloted with a small group of educational leaders to ensure clarity and relevance. Based on feedback, adjustments were made to improve the questionnaire's structure. The open-ended questions focused on areas such as crisis response, long-term preparedness, and recovery strategies, allowing participants to fully reflect on their experiences. The flexibility of online questionnaires enabled participants to respond at their own pace, promoting deeper reflection and more thoughtful responses.

Data analysis

The responses were analyzed using Braun and Clarke's (2006) six-phase thematic analysis, a rigorous and systematic approach to qualitative data analysis. This process began with familiarization, where the researcher reviewed the dataset multiple times to gain an overall understanding of the data. In the second phase, initial codes were generated by identifying significant statements and key phrases related to the challenges and strategies of the school heads. These codes were then grouped into potential themes in the third phase, focusing on patterns that emerged across the dataset.

In the fourth phase, themes were reviewed and refined to ensure they captured the full complexity of the participants' lived experiences. The researcher revisited the data several times throughout the process to refine the coding and ensure all relevant data were accounted for. During the fifth phase, the themes were clearly defined and named, capturing the essence of participants' struggles and coping strategies. Finally, in the sixth phase, a detailed narrative was constructed that linked the identified themes to the broader research questions, providing a comprehensive understanding of the phenomenon.

The coding process was supported by NVivo software, which allowed for efficient data management and deeper analytical insights. Additionally, to ensure the credibility of the findings, member checking was conducted by sharing preliminary themes with participants to verify the accuracy of the interpretations. Inter-coder reliability was established through collaboration with a second researcher, ensuring that the themes were consistently interpreted and agreed upon.

Ethical considerations

Ethical considerations were carefully addressed. Informed consent was obtained digitally, and participants were fully briefed on their rights, including the right to withdraw from the study at any point. All responses were anonymized, and data were securely stored on encrypted servers to protect participants' privacy. Given the sensitive nature of the topic, the study also ensured that participants had access to appropriate resources if any distress arose during or after data collection.

Data presentation and analysis

This section presents findings from structured interviews conducted with elementary teachers in Marcos, organized by key themes identified during the interviews.

Problem 1: What benefits do school garden programs provide to students and the school community in terms of learning, environmental awareness, health, and social development?

Theme1: Learning benefits (academic & experiential learning)

The thematic analysis revealed that students described their learning experiences in the school garden as enjoyable, practical, and meaningful. Participants emphasized that the garden provides opportunities for hands-on learning and allows them to apply academic concepts in real-life situations.

One student mentioned,
"Students enjoy planting, watering, and harvesting vegetables in the garden." (R7)

Another response stated that the school garden helps learners develop responsibility by caring for plants and maintaining the garden.

Quantitative data indicated that 7 responses described the school garden learning experience as fun and enjoyable, while 3 highlighted hands-on, practical learning. Additionally, 2 of the responses emphasized improved understanding of academic subjects, 2 mentioned the development of responsibility and teamwork, and 1 referred to students' connection with nature. These findings suggest that the school garden provides an engaging learning environment where students can develop practical skills while strengthening their understanding of academic lessons. This supports recent studies showing that experiential and hands-on learning approaches increase student engagement and improve learning outcomes (Yusof et al., 2020).

Table 1. Participants' perceptions of learning benefits: Academic and experiential learning

Category / Code	Description of Responses	Participant
Fun and enjoyable learning	Students described the garden activities as enjoyable and engaging.	7
Hands-on and practical learning	Students highlighted that the garden allows them to learn by doing and apply lessons in real-life situations.	3
Improved understanding of academic subjects	The garden helps students better understand academic lessons through real-life application.	2
Development of responsibility and teamwork	Students develop responsibility by caring for plants and working together to maintain the garden.	2
Connection with nature	Students experience a closer relationship with nature while working in the garden.	1
Total		15

Note: Data were collected from teachers at Elizabeth Elementary School and Ferdinand Elementary School using Google Forms.

Theme 2: Environmental awareness & sustainability

The thematic analysis revealed that students developed a stronger relationship with nature after participating in the garden program. Participants emphasized that gardening activities helped them feel more connected to the environment and increased their appreciation for nature. Many students mentioned

that caring for plants allowed them to understand how living things grow and why it is important to protect the environment. One response stated,

"Students say they feel closer to nature." (R1)

Another participant shared that students became more responsible by watering plants, cleaning the garden, and taking care of their surroundings at both school and home.

Quantitative data indicated that 6 of the responses described students feeling more connected to nature, while 4 emphasized developing responsibility toward the environment. Additionally, 3 of the responses highlighted increased environmental awareness, and 2 mentioned students' appreciation and love for nature. These findings suggest that participation in the garden program strengthens students' environmental awareness and fosters positive attitudes toward caring for nature. This supports recent research showing that school garden programs enhance students' environmental attitudes and promote a deeper connection with nature (Williams & Dixon, 2017).

Table 2. Participants' perceptions of environmental awareness and sustainability

Category / Code	Description of Responses	Participant
Stronger connection with nature	Students reported feeling closer to nature after participating in gardening activities.	6
Development of environmental responsibility	Students became more responsible by watering plants, cleaning the garden, and caring for their surroundings.	4
Increased environmental awareness	Students gained a better understanding of environmental protection and the importance of caring for living things.	3
Appreciation and love for nature	Students expressed greater appreciation and positive feelings toward nature.	2
Total		15

Note: Data were collected from teachers at Elizabeth Elementary School and Ferdinand Elementary School using Google Forms.

Theme 3: Health & well-being

The thematic analysis revealed that students experienced noticeable changes in their eating habits after participating in the school garden program. Participants highlighted that gardening activities encouraged them to appreciate vegetables and understand the importance of healthy eating. Many students shared that before joining the program, they were less interested in vegetables and often preferred processed or packaged foods. However, after growing and harvesting their own vegetables, they became more willing to taste and eat fresh produce. One response stated,

"Before, some students did not like vegetables, but after participating in vegetable gardening, they became interested in eating vegetables." (R6)

Another response mentioned that students developed pride in eating the food they helped plant and grow.

Quantitative data indicated that 6 responses described increased interest in eating vegetables, while 4 highlighted improved awareness of healthy eating and nutrition. Additionally, 3 responses reflected students' willingness to try new vegetables, and 2 reported general improvements in eating habits after participating in the garden activities. These findings suggest that involvement in the garden program can positively influence students' food choices and promote healthier eating behaviors. This supports recent research showing that garden-based learning programs can improve children's willingness to consume fruits and vegetables and increase their awareness of healthy nutrition (Savoie-Roskos, Wengreen, & Durward, 2017).

Table 3. Participants' perceptions of health & well-being

Category / Code	Description of Responses	Participant
Increased interest in eating vegetables	Students became more interested in eating vegetables after growing and harvesting them in the garden.	6
Improved awareness of healthy eating and nutrition	Students developed a better understanding of the importance of healthy eating and balanced nutrition.	4
Willingness to try new vegetables	Students showed openness to tasting and trying vegetables they had not eaten before.	3
General improvement in eating habits	Students reported overall healthier food choices and eating behaviors after participating in garden activities.	2
Total		15

Note: Data were collected from teachers at Elizabeth Elementary School and Ferdinand Elementary School using Google Forms.

Theme 4: Social development & community building

The thematic analysis revealed that students described working together in the school garden as a cooperative and enjoyable experience. Participants highlighted that gardening activities allowed them to share tasks, communicate effectively, and solve problems as a team. One student noted,

"Working together in the garden is fun. We share tasks like planting and watering, and it helps us learn teamwork and become better friends." (R3)

Another participant emphasized that gardening strengthened their friendships and encouraged unity among classmates.

Quantitative data indicated that 7 responses described teamwork and cooperation as the main benefit, 4 highlighted improved communication skills, and 3 mentioned stronger friendships and social connections. An additional 1 noted that students developed a sense of responsibility through shared tasks.

These findings suggest that participating in school garden activities promotes social development, collaboration, and community building among students. This supports recent research showing that school gardening programs can foster teamwork, communication skills, and positive social interactions in children (Blair, 2019).

Table 4. Participants' perceptions of social development & community building

Category / Code	Description of Responses	Participant
Teamwork and cooperation	Students worked together in gardening activities such as planting, watering, and maintaining the garden.	7
Improved communication skills	Students communicated with classmates while sharing tasks and solving problems in the garden.	4
Stronger friendships and social connections	Gardening activities helped students build stronger relationships and friendships with their classmates.	3
Development of responsibility through shared tasks	Students developed a sense of responsibility by contributing to group tasks and maintaining the garden together.	1
Total		15

Note: Data were collected from teachers at Elizabeth Elementary School and Ferdinand Elementary School using Google Forms.

Problem 2: What are the major challenges faced by schools in implementing school garden programs in terms of resources, time, maintenance, and stakeholder support?

Theme 1: Resource constraints (funding, materials, space)

The thematic analysis revealed that school staff described financial challenges as a significant barrier to starting and maintaining the school garden. Participants highlighted that limited school budgets make it difficult to purchase essential materials such as soil, seeds, and gardening tools. One staff member noted,

"Some schools have limited budgets, so we rely on donations, partnerships, or support from the local community to sustain the garden." (R2)

Another response emphasized that maintaining the garden often requires creativity, collaboration, and support from parents and community organizations to ensure its continuity.

Quantitative data indicated that 6 responses identified limited funding as the main challenge, 4 highlighted reliance on donations and community support, 3 mentioned ongoing maintenance costs, and 2 emphasized the need for creative solutions to manage expenses. These findings suggest that financial limitations are a key consideration in sustaining school garden programs, yet collaborative and innovative approaches can help overcome these barriers. This supports recent research indicating that

school garden initiatives often require creative funding strategies and community partnerships to succeed (Somerset & Markwell, 2017).

Table 1. Participants' perceptions of resource constraints (funding, materials, and space)

Category / Code	Description of Responses	Participant
Limited school funding	Schools face difficulty purchasing materials such as soil, seeds, and gardening tools due to limited budgets.	6
Reliance on donations and community support	Schools depend on donations, partnerships, and support from parents and local organizations to sustain the garden.	4
Ongoing maintenance costs	Continuous expenses are required to maintain the garden and replace materials.	3
Need for creative financial solutions	Staff emphasized the use of innovative strategies and collaboration to manage garden expenses.	2
Total		15

Note: Data were collected from teachers at Elizabeth Elementary School and Ferdinand Elementary School using Google Forms.

Theme 2: Time constraints (curriculum & scheduling)

The thematic analysis revealed that teachers face challenges in balancing garden activities with academic requirements. Participants highlighted that limited instructional time and curriculum demands make it difficult to schedule regular gardening sessions. One teacher noted,

"To balance the academic requirements and garden activities, we intentionally integrate garden tasks into our core subjects—such as using plant growth for science experiments, measuring garden beds in math, or writing reflections in language arts—to ensure academic goals are still being met." (R8)

Another teacher emphasized that after-school or short garden sessions also help students participate without affecting lessons.

Quantitative data indicated that 6 responses described careful lesson integration as the main strategy, 4 highlighted the use of after-class or recess time, 3 mentioned planning and time management, and 2 emphasized collaborative scheduling with other teachers. These findings suggest that while curriculum demands present time constraints, integrating garden activities into academic lessons and using strategic scheduling allows teachers to maintain both educational objectives and hands-on learning opportunities. This supports recent research indicating that school gardens can be successfully incorporated into academic curricula when careful planning and lesson integration strategies are applied (Blair & Sanford, 2017).

Table 2. Participants' perceptions of time constraints (curriculum & scheduling)

Category / Code	Description of Responses	Participant

Lesson integration with academic subjects	Teachers integrate garden activities into subjects such as science, math, and language to meet academic goals.	6
Use of after-class or recess time	Garden activities are conducted after class or during recess to avoid interrupting regular lessons.	4
Planning and time management	Teachers emphasize careful planning and time management to balance academic lessons and garden work.	3
Collaborative scheduling with other teachers	Teachers coordinate with colleagues to schedule garden activities effectively	2
Total		15

Note: Data were collected from teachers at Elizabeth Elementary School and Ferdinand Elementary School using Google Forms.

Theme 3: Maintenance & sustainability issues

The thematic analysis revealed that schools implement various strategies to maintain their gardens during school breaks. Participants highlighted that garden maintenance often requires coordination among staff, parents, and community volunteers. One school staff member noted,

"Assigned students take turns watering and weeding, and we also tapped our PTA and community volunteers for help. Some use low-maintenance plants to ensure the garden survives even with limited supervision." (R3)

Another participant emphasized that scheduling and planning, such as assigning staff or using strategic crop selection, help the garden thrive while classes are not in session.

Quantitative data indicated that 5 responses described reliance on staff and volunteers, 4 highlighted supports from parents and the PTA, 3 mentioned strategic crop selection or low-maintenance practices, and 3 emphasized student rotation schedules. These findings suggest that schools use a combination of human and practical strategies to sustain garden activities during breaks. This supports recent research indicating that community involvement, careful planning, and low-maintenance practices are key to sustaining school gardens during periods when students are not present (Morris & Zidenberg-Cherr, 2017).

Table 3. Participants' Perceptions of Maintenance & Sustainability Issues

Category / Code	Description of Responses	Participant
Reliance on staff and volunteers	School staff and community volunteers help water, weed, and maintain the garden during school breaks.	5
Support from parents and PTA	Parents and PTA members help maintain the garden when students are not present.	4

Strategic crop selection / low-maintenance practices	Schools plant crops that require minimal care, ensuring the garden survives with limited supervision.	3
Student rotation schedules	Students are assigned schedules to take turns watering and maintaining the garden.	3
Total		15

Note: Data were collected from teachers at Elizabeth Elementary School and Ferdinand Elementary School using Google Forms.

Theme 4: Stakeholder support (teachers, parents, administration, community)

The thematic analysis revealed that teachers perceive their role in the garden program as multifaceted, encompassing guidance, facilitation, and mentorship. Participants highlighted that teachers not only instruct students in planting and maintaining the garden but also model environmental responsibility, teamwork, and sustainability.

One teacher noted,
"In our school, the garden is an extension of the classroom, providing hands-on opportunities to teach subjects such as science, math, and nutrition, while also fostering environmental awareness and sustainability." (R8)

Another participant emphasized that teachers coordinate with parents and community volunteers to ensure the garden receives adequate support and resources.

Quantitative data indicated that 5 responses described teachers' roles as guides and facilitators, 4 emphasized organization and coordination with stakeholders, 3 highlighted mentorship and modeling of responsible behaviors, and 3 mentioned active involvement in planning and supporting students' learning experiences. These findings suggest that teachers play a central role in sustaining school garden programs by combining instructional, organizational, and motivational responsibilities. This aligns with recent research showing that teacher involvement is critical for the success of school garden programs, particularly in promoting student learning, environmental awareness, and collaborative engagement (Blair & Sanford, 2017).

Table 4 Participants' perceptions of stakeholder support (teachers, parents, administration, community)

Category / Code	Description of Responses	Participant
Guide and facilitator	Teachers instruct students on planting and maintaining the garden, providing hands-on learning opportunities.	5
Organization and coordination with stakeholders	Teachers coordinate with parents, community volunteers, and other staff to ensure adequate support and resources.	4

Mentorship and modeling responsible behaviors	Teachers model environmental responsibility, teamwork, and sustainable practices for students.	3
Active involvement in planning and supporting learning	Teachers actively plan garden activities and support students' learning experiences in coordination with academic goals.	3
Total		15

Note: Data were collected from teachers at Elizabeth Elementary School and Ferdinand Elementary School using Google Forms.

Results and discussion

The study highlights the multifaceted benefits and challenges of school garden programs, particularly regarding learning, environmental awareness, health, and social development. School gardens provide students with hands-on learning experiences that make lessons more engaging, practical, and meaningful. Through activities such as planting, watering, and harvesting, students can connect classroom concepts to real-life situations while developing responsibility, teamwork, and problem-solving skills. As one student shared, "Students enjoy planting, watering, and harvesting vegetables in the garden." Quantitative findings further support this, with seven responses describing the experience as fun and enjoyable, and three emphasizing its practical, hands-on nature, reinforcing prior research indicating that experiential learning enhances engagement and academic outcomes (Yusof et al., 2020).

Participation in school gardens also strengthens students' connection with nature and fosters environmental awareness and responsibility. Learners reported feeling more connected to the environment and more mindful of caring for plants and living things. This is reflected in the data, where six responses indicated a sense of closeness to nature and four highlighted environmental responsibility, aligning with studies that show school gardens promote environmental stewardship among children (Williams & Dixon, 2017).

In addition, school gardens contribute positively to students' health and well-being. Participants demonstrated increased openness to healthy eating, greater interest in fresh vegetables, and improved awareness of proper nutrition. Quantitative data revealed that six responses indicated increased interest in vegetable consumption, while four emphasized heightened nutrition awareness. These findings are consistent with research suggesting that school garden programs positively influence dietary behaviors and nutrition knowledge (Savoie-Roskos, Wengreen, & Durward, 2017).

Social development also emerged as a significant benefit, as school gardens promote cooperation, communication, and relationship-building among students. Participants described positive interactions that foster teamwork and strengthen friendships. This is supported by data showing that seven responses highlighted teamwork, four emphasized communication skills, and three noted enhanced social connections, which are consistent with the literature indicating that school gardens encourage collaboration, problem-solving, and social engagement (Blair, 2019).

Despite these benefits, several challenges in implementing school garden programs were identified, including limited funding, time constraints, maintenance demands, and the need for active stakeholder engagement. Teachers and staff reported that financial limitations often necessitate reliance on donations and community support (six responses), while curriculum pressures and scheduling conflicts restrict consistent integration of garden activities (Blair & Sanford, 2017). Maintenance during school breaks also requires strategic planning, such as student rotation systems, staff supervision, and low-maintenance planting approaches (Morris & Zidenberg-Cherr, 2017). Nevertheless, educators emphasized that school gardens remain valuable experiential learning tools that support academic growth, personal development, and environmental responsibility, with five responses highlighting their role in facilitating learning.

The findings contribute significantly to theory by reinforcing and extending frameworks in experiential learning and environmental education. The results strongly support Experiential Learning Theory, demonstrating how hands-on garden activities enable students to transform abstract concepts into meaningful, real-world understanding. At the same time, the study contributes to Environmental Education by providing empirical evidence that school gardens not only enhance knowledge but also foster environmental attitudes, responsibility, and behavioral change. Unlike studies that focus on isolated outcomes, this research highlights the interconnected nature of academic learning, health awareness, environmental stewardship, and social development within a single intervention. It also underscores the influence of contextual factors—such as resource availability, teacher facilitation, and stakeholder engagement—in shaping program effectiveness, offering a more holistic and integrative perspective on garden-based learning.

From a policy perspective, the study provides evidence-based insights for educational leaders, administrators, and policymakers in designing sustainable school garden programs. The findings suggest that integrating school gardens into the formal curriculum can enhance student engagement, promote healthy lifestyles, and support environmental education goals. However, the identified challenges—particularly in funding, time allocation, and maintenance—highlight the need for institutional support through dedicated budgets, structured implementation guidelines, and capacity-building initiatives for teachers. Strengthening partnerships among schools, local government units, and community organizations may further ensure sustainability and shared responsibility. Ultimately, embedding school garden programs within broader educational and public health policies positions them as a strategic tool for promoting holistic student development, sustainability education, and community engagement.

Conclusion

The findings of this study demonstrate that school garden programs offer multifaceted benefits for students and the school community, encompassing academic learning, environmental awareness, health, and social development. Participation in the garden provided students with hands-on, experiential learning opportunities that reinforced academic concepts, cultivated responsibility, and enhanced teamwork. Students also reported a stronger connection to nature, increased environmental stewardship, improved eating habits, and a greater willingness to consume fresh vegetables. Additionally, school

gardens fostered collaboration, communication, and positive social interactions, strengthening peer relationships and promoting a sense of community.

Despite these advantages, schools face significant challenges in sustaining garden programs. Resource constraints, including limited funding and materials, time pressures due to curriculum demands, maintenance requirements, and the need for active stakeholder support, were commonly cited barriers. Teachers, parents, and community members play a central role in overcoming these challenges through coordination, planning, and creative problem-solving.

Overall, the study highlights that the success of school garden programs relies on strategic planning, stakeholder engagement, and integration with the academic curriculum. These programs not only enhance students' educational experiences but also promote healthier lifestyles, environmental responsibility, and social cohesion. The findings suggest that policymakers, school administrators, and educators should prioritize support, resources, and training to sustain and expand school garden initiatives, maximizing their positive impact on students and the broader school community.

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