

# **Nature and Nurture: Gardening and its Perceived Impacts by Educators on Students' Environmental and Social Awareness at an Early Childhood Institution in Trelawny**

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## **Abstract**

The broad aim of the proposed study was to explore the perceptions of teachers at an early childhood institution (ECI) located in Northern Trelawny on how gardening influences the environmental and social awareness of students 3-6 years old. Gardening is noted to be a valuable tool that can be used to transform the educational journey of students across the globe, as it connects students to the natural environment and has the potential to improve students' academic accomplishments, dietary choices, and holistic development. Although gardening in schools has long been a significant part of the drive of the Ministry of Agriculture in Jamaica, few schools and educators have implemented gardens or integrated them into their pedagogical practices. This study, which was conducted within a qualitative framework, found that gardens are a potent tool to enhance children's environmental awareness, social interaction, and communication.

*Keywords:* Jamaica, vegetable garden, environmental awareness, social interaction

## **Background and Rationale for the Study**

The role of a teacher is to guide, inspire, and bring out the best in students. Teachers encourage students to recognize their true potential and help them to develop the necessary skills to become future contributors to the economy, and by extension, to the environment. Gardening is one such valuable skill that can be used to transform the educational journey of students worldwide. By connecting young learners to the natural environment, gardening can potentially improve their academic accomplishments, encourage dietary exploration, and contribute to their overall holistic development (Floristkid Team, 2023).

GreenHeart Education (n.d.) described school gardens as outdoor spaces specifically designed for students to learn about the ecosystem, where other subjects such as English, Science, Math, Art, and Social Studies are integrated to create a multi-faceted educational experience.

The origins of school gardens can be traced to 16th century Europe when Jan Amos Comenius, the Czech philosopher, lobbied for schools to be equipped with gardens so that children could observe and interact with the natural environment (Desmond et al., 2004). Australia, Europe, and the United States have seen school

gardens play a more significant role in the educational process; where numerous school gardening websites and associations have been established with tips and instructions on how to create and implement them, from kindergarten to the college level (Michigan State University, 2023). Despite this, Jamaica, like much of the Caribbean, has yet to formally adopt garden-based teaching in early childhood institutions (ECIs). Instead, more emphasis has been placed on primary and high schools, utilizing gardens so that their learning environment can be improved (Food and Agriculture Organization of the United Nations [FAO], 2022). In 2022, the former Jamaican Minister of Agriculture and Fisheries, Parnell Charles Jr., spoke about expanding the school gardening programmes in primary and high schools (Jamaica Observer, 2022). At the Expanded School Garden Programme launch at Newell High, the Ministry proposed to specifically target primary and high schools to expand their school gardening initiatives (Sterling, 2023), whilst overlooking the early childhood (EC) sector — perhaps the most critical level of the education journey.

The top-ranking factor influencing institutions to utilize school gardens is to enhance academic instruction, where students were provided with an authentic environment to improve academic performance (Papadopoulou et al., 2020). Another factor that influenced institutions to utilize school gardens was that gardens allowed students to connect with nature, stirring children's curiosity and care for the environment (Papadopoulou et al., 2020). Furthermore, a research study conducted by Zijlema et al. (2019) has shown that adults who lacked direct experience with the natural environment during their childhood did not see the significance of engaging with nature in their adulthood. Hence, exposing children to school gardens, at three to six years old, would have the opposite effect, influencing them to have a greater connection with their natural habitat (Kids Gardening, 2023).

Agriculture, particularly food security, was another factor that prompted the implementation of school gardens, especially in Jamaica. Portfolio Minister, the Hon. Floyd Green, stated that the

intention of the school garden initiative was "to revolutionize Jamaica's approach to food security" so that children could be "introduced to practical elements in agriculture" (Jamaica Information Service [JIS], 2017, p. 5-6). This would, in turn, assist with the school feeding programme in schools as it would boost agricultural production and provide nutritious foods — thereby developing healthy eating habits among the school population (Jamaica Observer, 2022; Papadopoulou et al., 2020).

## Rationale

The United Nations Educational, Scientific, and Cultural Organization (UNESCO, n.d.) has recognized that national education systems have fallen short of educating young learners about climate change and have not adequately prepared them to care for the environment and address environmental issues. The Jamaican education system is one such example. The objectives of the early childhood education curriculum encourage students to have respect for self, others, and the environment, and to a) show respect for nature, living things, and recycling; b) demonstrate moral values; c) keep the classroom environment clean; and, d) discuss the beauty of the environment and develop pride and sense of care for the environment (Maye-Hemmings & Wint, 2010). However, very little has been done to ensure that this aspect of the curriculum is imparted to early childhood students in practical, authentic ways. According to the Early Childhood Commission (ECC), only four institutions have been recorded as having functioning vegetable gardens (Ms. S. Blake, personal communication, November 20, 2023). There is also concern that the focus is more on using notebooks and textbooks than on creating authentic learning experiences, for e.g. nature walks and fieldtrips. This issue was exacerbated by the COVID-19 pandemic, as the Caribbean Policy Research Institute (CAPRI) and United Nations Children's Fund (UNICEF) Jamaica (2021) reported that early childhood students "had the lowest level of engagement in educational

activities during virtual classes ... which resulted in severe learning gaps" (p. 20). These learning gaps were not only academic but were also reflected in the ways that schools shaped environmentally aware and caring children. This situation is serious cause for concern, as it could negatively impact the environment and cause students to disassociate themselves from their natural habitat, especially as they become adults (Zijlema et al., 2019).

While the benefits of gardening are widely acknowledged, the current local literature in the early childhood sector is almost non-existent. Hence, there is a need for up-to-date exploration of its impact on the educational setting. The intersection of gardening and environmental stewardship requires a thorough investigation, especially within the context of the growing environmental challenges in Jamaica and the world.

## Literature Review

### Introduction

School gardens tend to have a positive impact on students' academic performance and their attitudes toward the environment. Enhancing academic instruction, facilitating students' connection with nature, and developing healthy eating habits amongst students were found to be the main factors influencing institutions to utilize school gardens (Austin, 2022; Pollin & Retzlaff-Fürst, 2021; Taylor et al., 2021). For this literature review, the researchers first sought to address the theoretical framework that guided the qualitative study; and then they delved into the main factors that influenced the establishment of gardens within institutions. The studies that the researchers came across were largely quantitative and focused on the elementary and high school levels (Graham & Zidenberg-Cherr, 2005; Skelly & Zajicek, 1998). The limitations of this approach arise from its inability to provide indepth exploration of the phenomenon (Creswell, 2018). Thus, this study seeks to fill this gap by conducting a

qualitative single case study that offers a deeper understanding of the topic at the early childhood level. Additionally, the literature review aimed to broaden the readers' knowledge base regarding the impact of authentic learning experiences in garden settings on academic performance by presenting the results of closely related studies. Supporting evidence was provided about how the integration of gardens influenced students' environmental stewardship and awareness of the environment, guided by theoretical underpinnings. Finally, the researchers present proposed strategies from related studies that could enhance the effective utilization of vegetable gardens to improve environmental stewardship and social awareness and interaction.

### Theoretical Framework

The theoretical frameworks used to guide this qualitative study were Kolb's Experiential Learning Theory and John Dewey's Constructivism. They have significantly contributed to garden-based learning, as their work has been referenced to explain gardens as a beneficial environment for meaningful learning. Experiential learning may be described as learners constructing knowledge based on direct experiences (University of California, 2016), where students can construct meaning based on their direct involvement with school gardens as they are learning by doing. David Kolb (1984) who proposed the Experiential Learning Theory stated that the theory works in four stages: a) concrete learning; b) reflective observation focused on the learner comprehending the experience; c) abstract conceptualization; and, d) active experimentation focused on reflection and application of new ideas (Western Governors University, 2020).

Constructivism, on the other hand, is a learning theory that examines how individuals construct their understanding by being actively engaged in the learning process. To achieve this, they must explore, think, ask questions, reflect, and assess what they already know. This is evidenced in Dewey's (1990) theoretical beliefs, as he called for education to be grounded in real experience and for schools to be renewed.

According to Dewey (1990), "the school has a chance to affiliate itself with life, to become the child's habitat, where he learns through directed living; instead of being only a place to learn lessons having an abstract and remote reference to some possible living to be done in the future" (p. 18). In his book, *Democracy and Education*, Dewey (2017) stated that "education is not an affair of 'telling' and being told, but an active and constructive process..." (p. 54). This same view is also replicated in his book, *The Middle Works of John Dewey* (1983) where he stated that we should "give the pupils something to do, not something to learn" (p. 161). For Dewey, this meant that learners should not passively take in information; they should actively participate in the learning process where they diligently seek knowledge and process the information around them. This theory provided insight into how gardening enhances environmental awareness, as gardening is grounded in real experience where students are encouraged to practice agricultural methods such as planting.

## **Factors that Influence the Use of School Gardens in Schools**

### **Social Awareness and Interaction**

Graham and Zidenberg-Cherr (2005) conducted quantitative studies exploring the perceptions of school principals and teachers regarding the use of gardens in academic institutions. The educators asserted that gardens "provided a valuable context for student learning" (p. 1798) which is not limited to improving critical thinking but importantly, facilitates social interaction, teamwork, and an overarching sense of social awareness amongst the students. In a study conducted by Waliczek et al. (2001), vegetable gardens not only contributed to an increase in test scores but also to a notable increase in communication skills. By integrating school gardens within the lesson, an engaging environment was created where students were able to utilize a hands-on approach by observing, touching, and conducting experiments whilst speaking to each other, sharing caring roles and becoming more knowledgeable about the medicinal properties of plants.

### **Healthy Eating Habits and Food Security**

Edible gardens are increasingly being used to raise children's awareness of sustainable practices and healthy food choices (Austin, 2022; Gong et al., 2022; Holloway et al., 2023). This is done in countries such as Germany, France where the schools participated in the Vegetable Garden World Cup and Brazil which has partnered with the Food and Agricultural Organization (FAO) to promote sustainable schools (FAO, 2026). Graham & Zidenberg-Cherr (2005) reported that three in ten principals used school gardens for edible produce. A follow-up survey by Graham and Zidenberg-Cherr (2005) revealed that teachers emphasized how gardens improved healthy eating habits. In Jamaica, the Ministry of Agriculture's plan was "to revolutionise Jamaica's approach to food security" (JIS, 2017, p. 5-6), hoping that this would assist the school feeding programme (Jamaica Observer, 2022). The National School Garden Programme has since been scaled up through an injection of J\$20 million from the Ministry to strengthen the capacity of gardens to increase food security and authentic learning experiences among students (The Ministry of Agriculture, Fisheries and Mining, 2025).

### **Environmental Awareness & Stewardship**

A growing body of research highlights the connection between school gardens and students' environmental awareness and stewardship (see, for example, Amiri et al., 2021 and Vieira et al., 2022). The consensus is that school gardens contribute to greater environmental awareness and stewardship among students. Similarly, Skelly and Zajicek's (1998) found that students involved in their GREEN Garden initiative had more positive environmental attitudes than those who did not participate. The researchers believed that naturalistic intelligence, proposed by Howard Gardner (1983) aids in understanding these findings, as it describes individuals with naturalistic intelligence as caring about the environment and wanting to connect with nature (Sadiku et al., 2020). Sadiku et al. (2020) argued that naturalistic intelligence emerged through

hands-on experiences where children “go outside, appreciate nature, cultivate a garden ...” (p. 2). Thus, the results from Skelly and Zajicek’s (1998) research were not surprising, as students could explore the natural world through Project GREEN, where each school within the experimental group installed gardens. Similarly, Vieira et al. (2022) observed that their Environmental Education Programmes in urban schools, in Brazil, with farms led to increased appreciation for the value and function of green spaces, as reflected in teachers’ perspectives during class engagement.

## Conclusion

In conclusion, school gardens tend to have a positive impact on students’ academic performance and attitudes toward the environment. However, the literature revealed gaps, with some studies being Eurocentric, fairly dated, or primarily quantitative, limiting insights into teachers’ perceptions and experiences. This examination revealed significant methodological limitations in the existing studies, resulting in a lack of indepth qualitative data and hindering a comprehensive understanding of the topic. This highlights the need for qualitative research to enrich the understanding of teachers’ perceptions and experiences, thereby justifying the current study’s design.

## Aims and Objectives

### Objectives of the Research

To achieve the purpose of the study, the following objectives were used as guiding points:

1. To understand how teachers perceive the influence of integrating garden-based lessons on ECE students’ commitment to environmental awareness and stewardship.
2. To explore how teachers perceive the impacts of the integration of garden-based lessons on ECE students’ social awareness.

## Research Questions

The research questions reflected the objectives outlined above. The following questions guided the study:

1. What are teachers’ perceptions of how the integration of gardens in lessons influences students’ environmental awareness and stewardship?
2. What are teachers’ perceptions of how the integration of gardens in lessons influences students’ social interaction?

## Methodological Design

### Overall Study Design

The research was conducted within a qualitative framework and sought to explore and provide deeper insights into the subject matter being investigated. This approach allowed the researchers to gather data “expressed mostly in the form of words—descriptions, accounts, opinions, feelings, etc.—rather than on numbers” (Walliman, 2021). The study was cross-sectional, as the necessary data were collected within a limited timeframe. This research is a single case study that served as an explorative approach to understanding the garden’s effectiveness in developing environmental stewardship and improving social awareness among students.

Single case studies are research designs that focus on the indepth investigation of a particular event or phenomenon. They enable researchers to uncover specific experiences and responses of research participants over time through various methods (including semi-structured interviews and observations) which served as the data collection methods for this study. In carrying out a single case study at the selected school in Trelawny, the researchers were able to get a comprehensive understanding of the teachers’ gardening practices and their insights into how they believe it has impacted their students. Furthermore, they could consider the unique cultural, environmental, and educational context of the region which can provide insights that might be overlooked in broader studies.

## **Location and Time Frame of the Study**

This research was conducted at an ECI situated in a rural (but developing) town in northern Trelawny, Jamaica. The institution has been operational for over 12 years, catering to K1-K3—children 3-6 years old. The Early Childhood curriculum emphasizes respect for self, others, and the environment; however, practical application of these principles at this institution has been limited. To address this gap, the school features a small garden constructed from old tyres, pipe fixtures, flowerpots, and plastic containers, serving as both a teaching-learning environment and a source of nutrition for students and staff. The school faced socio-economic challenges, requiring assistance to purchase resources such as drums for water and to access water due to occasional drought conditions. Additionally, support was needed to obtain seedlings and fertilizer, which could impact the garden's health. Parental and community involvement was therefore vital, with community members such as local farmers assisting in its upkeep and demonstrating how to use the garden effectively. Teachers aimed for students to actively participate in the upkeep of the garden and compete in the 4-H school garden competition, thereby fostering a sense of responsibility and connection to their environment. The timeframe for this study was March – June 2024.

## **Research-Related Justification for Sample Size**

All six teachers employed at the school were selected as study participants. However, only four were available to participate in the study. Although this small number limited the study's external validity, the four teachers shed light on their experiences and knowledge of how the use of gardens influenced their students' environmental and social awareness. Given that the researchers aimed to explore these perceptions and not to generalize from the findings, the inclusion of the four teachers was deemed acceptable.

## **Recruitment of Subjects**

Ethical clearance was obtained from the Mona Campus Research Ethics Committee before the data were collected. A letter was delivered to

the principal of the identified ECI, accompanied by the research proposal. The six teachers also received letters explaining the purpose of the study and inviting them to participate. These documents served as the underpinning for obtaining the necessary permission to conduct the research. After receiving approvals, the aim was to initiate benchmark activities, including a comprehensive site visit, so that the researchers could familiarize themselves with the institution's environment and lay the foundation for subsequent data collection.

## **Research Procedures**

### **Methods of Sampling**

The researchers were interested in collecting qualitative data. To do this, they employed convenience and purposive sampling techniques, which Patton (2002) dictated are frequently used to identify and choose cases that provide vast amounts of information and make optimal use of limited resources. This procedure allowed the researchers to identify individuals who would possess the knowledge and experience about the phenomenon to be explored (Creswell & Plano Clark, 2011). To begin, the ECI in northern Trelawny, Jamaica, was selected using the purposive sampling technique as it had the unique characteristic of a garden on its premises that served as a teaching-learning environment. This setting allowed researchers to garner indepth information from educators on the impact of authentic learning experiences in garden settings on the students. The teachers selected for this study had direct experience in integrating gardening into their teaching practices. The interviews allowed for a rich and detailed exploration of their perspectives (Creswell, 2017).

### **Data Collection Methods**

Data collection instruments were used to obtain practical and functional information from the sample population. In this qualitative study, the researchers used various methods to collect relevant participant information, including semi-structured interviews and observations. The researchers used semi-structured interviews to investigate teachers' perceptions regarding

the influence of garden integration in lessons on students' environmental awareness and social interaction. Magaldi and Berler (2020) characterized semi-structured interviews as an exploratory technique used to arrive at an answer, generally guided by a framework focused on the main topic; thereby allowing researchers to dig deeper for information in their pursuit of information discovery. The semi-structured interviews had predetermined questions but also allowed for flexibility in probing responses. Some of the interview questions included: "In what ways do you think the use of the garden helps students learn about taking care of the environment?" and "How do you think the garden activities influence students' ability to work with others?" The interviews were recorded with permission and transcribed for analysis. The researchers were also careful in carrying out specific measures that would ensure the privacy of the participants. These measures included:

1. Obtaining written consent from the participants and informing them that their participation was voluntary;
2. Explaining to participants that their responses would be kept confidential and used for research purposes only;
3. Assigning each participant a unique identifier (pseudonym) instead of using their name or other personal information;
4. Ensuring that interviews were conducted in a private location where participants felt comfortable discussing sensitive topics; and
5. Storing all data collected in a secure location with restricted access.

The researchers also observed the condition of the garden, and systematic documentation was completed. The observation of the garden was accompanied by taking photos of the garden area, providing details of the garden settings. An observation checklist was also used to evaluate various conditions of the garden, including the presence of pests, weeds, soil quality, and leaf health. To analyze the observations, the researchers reviewed the documented observations and photographs

and identified themes and patterns regarding the garden's health and its impact on the learning environment. The analysis specifically focused on whether particular conditions noted in the checklist were present or absent. This allowed for an indepth understanding of how specific conditions noted in the checklist influenced both environmental awareness and social interactions among students. These methods aligned with the explorative single case study design, which establishes a specific criterion for understanding the effectiveness of the school garden (Yin, 2017).

### Methods of Data Analysis

The researchers used the thematic analysis approach to analyze the data collected from this study. Thematic analysis is the study of patterns to bring about meaning from an inductive or deductive frame (Creswell, 2017). The researchers closely examined the text to identify the common themes and determine the meaning of emerging patterns. This was done in six carefully outlined steps, including familiarization (getting to know the script or text); coding (highlighting phrases or sentences to develop shorthand labels to describe their content); generating themes (identifying patterns among codes); reviewing the established themes (ensuring themes are useful and accurate in representing the data); defining and naming themes (deciding what each theme means and how it helps in understanding the data to give it an appropriate name that describes it well); and writing up the findings (Caulfield, 2023). The researchers analyzed the qualitative research instruments — semi-structured interviews and observation checklists; then re-read the data collected from these instruments and coded the data. After creating codes, the researchers established themes and central ideas that surfaced from the data collected. These themes were reviewed and then narrowed down to a general name, which was defined. This manual approach to data analysis facilitated the triangulation of data from interviews, photographs, and observations, ensuring a comprehensive understanding of the participants' experiences.

Limitations

There was limited external validity due to the small sample size. Nevertheless, the findings shed important light on the phenomenon of the use of gardening in improving students’ academic performance and environmental commitment. Secondly, there was limited generalizability. Thirdly, the study was cross-sectional and not longitudinal; therefore, it did not capture the patterns affiliated with the phenomenon over a long period. Thus, the findings of this study may not necessarily apply to other school settings. Further research would be required to extrapolate and apply these findings to other school settings.

Findings

Vegetable gardens are an essential means of encouraging the critical thinking, numeracy, and literacy capabilities of the 21st-century learner. Importantly, they should also be seen as viable mechanisms to instill knowledge of and values for the natural environment. A common thread that

ran through our interviews with the teachers was that the vegetable garden has been instrumental in shaping a deep sense of appreciation for the natural environment, demonstrating Gardner’s (1999) naturalist intelligence. This appreciation for the environment was precipitated by the variety of gardening activities and frequency of interaction with the garden, which also supported Kolb’s (1984) theory that knowledge is ideally created through engaging with experiences. Four of the six teachers at the school were interviewed. As seen in Table 1, all were females from 30-39 years with at least 10 years of experience in the classroom (with one exception in years of experience and age).

From our field visit and observation of the school environment and garden space, we arrived at three themes: enhancement of environmental and social awareness; increase in environmental stewardship, and the facilitation of social interaction and communication amongst the students.

Table 1  
Profile of Respondents

| Pseudonym Assigned | Gender | Age Group   | Number of Years Teaching |
|--------------------|--------|-------------|--------------------------|
| Ms. Elizabeth      | Female | 30-39       | 4                        |
| Ms. Thomas         | Female | 30-39       | 15                       |
| Ms. Chester        | Female | 50 and Over | 20                       |
| Ms. Ann            | Female | 30-39       | 15                       |

The influence of the integration of gardens in the lessons on the students’ environmental awareness and Stewardship

Sub-theme 1: Notable increase in environmental awareness and responsibility

It is widely accepted that outdoor learning opportunities are vital to the holistic development of young children. What better time to provide authentic learning whilst simultaneously building their sense of environmental awareness and responsibility than when they are in their formative years? In reference to the theory that

informs this study, Kolb’s Experiential Learning Theory, it is safe to conclude that “By engaging students in hands-on experiences and reflection, they are better able to connect theories and knowledge learned in the classroom to real-world situations” (Kent State University, 2026, p.1). Unequivocally, the vegetable garden is a valuable bridge that connects classroom knowledge with the real world, whilst building their sense of civic responsibility for the environment. Environmental stewardship can be broadly understood as “the responsibility for environmental quality shared by all those whose actions affect the environment, reflected as both a value and a practice by individuals, companies, communities, and

government organizations” (U.S. Environmental Protection Agency, 2005, p.8). The first step to environmental stewardship is environmental awareness (Blanchard & Buchanan, 2011).

A common thread that ran through the interviewees’ feedback on the importance of the vegetable garden in promoting environmental stewardship was that the students developed a strong interest in and concern for the environment. Ms. Ann, for instance, noticed that her students wanted to take care of the plants and that the:

children know the word “conservation” because of pollution as a topic teacher brought up: the importance of replanting, info to take home re planting, and conserving. They help with cleaning the garden—weeding, removing [the] stones [and] raking.

Likewise, Ms. Chester concluded that the children “learn to take care of things in their environment ... know how to appreciate things in their environment [therefore, they] can’t just pull up any plant because it’s an important plant.”

The teachers indicated that the students responded positively to “getting their hands dirty” - and practically engaged with planting, caring for, or harvesting the crops. Upon field observation by the researchers, a wide array of lentils, fruits, and vegetables were noticed not only in the garden area outdoors, but random crops were also noticed in some of the classrooms. One was a ginger plant (Figure 1) seen in one of the 4-year-olds’ classrooms.

**Figure 1**

*Potted Ginger Crop Planted by Students*



**Figure 2**

*Sugar Bean Vine - Planted by the Children*



Ms. Ann, Ms. Chester and Ms. Thomas said that the children were curious learners who enjoyed being outside. Ms. Ann recalled an instance where she took the 5-year-olds on a nature walk. She expressed that "They're curious, they love the outside, so I will take them outside. They are curious about different plants and their uses." Likewise, Ms. Chester explained how she integrated gardening into her lessons, with students being involved in the different stages of the plant life cycle, "they will go to the plant garden (our plants) for one of the assessments they would have planted a seed and watched it grow."

Ms. Thomas also emphasized how gardening teaches responsibility and environmental care. She used hands-on tasks to do this, with students responsible for watering, fertilizing, and the pruning plants around them. She explained how she used organic compost as fertilizer and involved her students in gardening through instruction and demonstration:

In terms of the fertilizing, I would have all of them help at the same time. Sometimes we'll have two persons at one tyre, right, and they just take up a handful of the compost and they put it, yes, they put it at the top of the soil, and they use sticks to dig it in.

This not only taught the students sustainable gardening practices but also instilled in them a sense of responsibility. She further explained that:

I have taught my students how to prune a tomato plant. I have explained to them why it's important to prune the tomato plant and also other plants. They understand why we prune the plants while we top the peppers. But I've never allowed them to do it.

Ms. Thomas also expressed that her students are able to monitor the health of plants by checking on their moisture levels:

I teach them how to check if the plant needs water by sticking their fingers all the way down, and if the finger comes back up dry, it means that the plant needs water. I find that they do that a lot with those two plants on the inside of the classroom. Just naturally, one of them

might be going to the bathroom and they might look down in the plant and check it and then they say "teacher, may I have a cup? I'm going to water the pear tree."

## **Sub-theme 2: Environmental Action Through Policing of the Younger Children**

The study revealed that younger children tended to unintentionally damage plants merely due to their curiosity, as reported by one teacher who stated, "Yes, but they will go and trouble the other things because ... they're fascinated. They see the vegetables and they see them hanging from the plant." This data revealed the emergence of peer monitoring behaviour among students. Ms. Thomas and Ms. Elizabeth described how children took to the role of garden protectors. Through constant, active interaction with the garden, students began to connect with it and to engage in informal policing of their peers, as they would observe and report to their teachers when other children attempted to damage the plant (intentionally or unintentionally). Ms. Thomas stated that her students would make verbal reports about students damaging the plants. This was also confirmed by Ms. Elizabeth, who noted that, "even if one broke a leaf, they would say Miss, Miss someone is damaging the flowers." Notably, students arrived at this behaviour without being prompted by their teachers. This could be as a result of them internalizing the value of the garden as reported by Chawla (2009) who suggested that this behaviour is a sign of environmental activism and stewardship.

Subsequently, these behaviours also created learning opportunities for children to understand the negative impact of plant damage. Having observed the students and their interaction with the plants, teachers would have to explain the importance of caring for them, as was noted by Ms. Thomas.

So, each time we must do something in the garden, it is explained to them how important it is to take care of plants because not only do they give us food, but they also give us oxygen.

The findings reveal that some students voluntarily started to police the garden, thereby solidifying their sense of responsibility for its

care and survival. Reports were that students would actively monitor the garden for any signs of damage, and alert the teachers if there were, mainly if the younger children were observed damaging any of the plants. A teacher reflected on this and reported:

I have some students who police the garden. They will be the first ones to tell me when a 4-year-old child or a 3-year-old baby comes into the garden and plucks off something, kicks the plant, or hits the plant.

The children's behaviour demonstrated a heightened sense of stewardship and some students became volunteers in the care, maintenance, and protection of the garden.

## **Social Interaction and Awareness**

### **Sub-theme 1: Collaboration (teamwork), Communication and Cooperation**

Gardening activities incorporated into the school's programme helped children develop a strong sense of teamwork, communication, and cooperation with each other. Teachers observed that when they assigned students to groups and gave each of them a gardening responsibility, they were helping to instill a sense of ownership, mutual support, and teamwork among students. During her interview, Ms. Ann described how students were encouraged to work together to carry out different gardening tasks:

This group, you are going to pull out the grass from the garden; this group, you give them a stick or something. You're going to dig a hole. Ok, you are going to plant, you are going to cover, you are going to water. So everyone gets a chance to be a part of it.

With each group being responsible for a different aspect of the gardening process, students were motivated to work together (teamwork) to ensure the garden's success. Ms. Ann further said that this division of labour helped the students be more responsible:

Well, it helps them to be responsible, because if they plant something, then we said ok, this group is responsible for watering it in the morning, or to watch it grow, or to report on it.

Communication was also a turning point for students, as they were able to interact with each other as peers while they took turns carrying out the different tasks. These activities also promoted social-emotional learning. Ms. Chester stated that, "the children interact with each other, and gain knowledge to have a better understanding." As Dewey (2017) purported, learning is a social, interactive process and communication should be seen as the cornerstone of this process.

At this level of educational development, school gardening can also serve as encouragement for students who have yet to develop their language skills, particularly those who tend to be quiet during classroom lessons. Pollin and Retzlaff-Fürst (2021) opined that "social interactions during the school garden lessons are often observable, and cooperative behaviour is particularly significant." In light of this, it was further noted that constant interaction is likely to promote cooperation among students. During the interview with Ms. Ann, she indicated that the garden was a place of shared excitement for children to come together and have conversations:

The garden really helps to bring children together, adults alike. Helps with knowledge sharing, helps them express themselves, making connections with the gardening.

Interestingly, the 4-year-olds were observed using the garden as conversation starters, as they would recall their own experiences amongst themselves. This was especially popular with the girls, as recounted by Ms. Ann:

The garden provides a topic of conversation where they share their own experiences (especially for girls), for boys they want to play and be rough with each other. Boys are happy to interact with the plants but require more guidance.

## Sub-theme 2: Dietary Awareness

There has been a perpetual call for greater attention to dietary awareness, particularly healthy food choices (Kos & Jerman, 2019). After the COVID-19 pandemic, which accelerated sedentary lifestyles, pediatricians and education stakeholders were more concerned about childhood obesity than ever before. According to a study published in the National Library of Medicine (Iacopetta et al., 2024), there has been a perpetual call for greater attention to dietary awareness, particularly healthy food choices (Kos & Jerman, 2019). Based on the concerns about childhood obesity and other health challenges that can affect children, healthy eating choices have become prominent in schools, starting with the No Sweet Drinks in Schools Campaign by the Ministry of Health and Wellness in Jamaica. Gardens not only contribute to more physical movement but also to healthier eating options, such as organically grown fruits and vegetables.

Gardening provides students with the opportunity to get involved in the food production process, allowing them to understand where food comes from. In line with a healthy eating mandate, children can reap the benefits of growing and eating the organic fruits and vegetables they have cultivated. The teaching and learning activities involved in gardening have reportedly helped students to understand the nutritional value of different food items. Ms. Elizabeth noted this when she reported that, “for instance, they will know that fruits are healthy to eat, because they’re children at school, we do have a fruit week. So, they will know that fruits are good for us.” As the students begin to recognize healthy foods through gardening activities, they are also introduced to nutritional values and where food comes from. Previous conversations between peers often involved them linking their experiences in the garden to things that their parents would purchase at the market. Ms. Thomas shared an experience where students were observed:

They link their previous experiences of the market and the supermarket by seeing these things and so they now link it to where it comes from.

The teacher’s notation reflected the students’ gardening experience, which strengthened their ability to identify food and made them aware of where it originates.

## Discussion of the Findings

The findings of this study revealed that the use of the vegetable garden in early childhood lessons is a potent source of empowerment — environmentally, socially, and culturally. This is in alignment with the ideas of Dewey (1990) and Kolb (1984). Dewey’s constructivist theory highlights learning through experiences. Kolb’s theory on experiential learning similarly emphasises learning as a cyclical process where students act, reflect, conceptualise, and apply new knowledge. With an acceleration in the calls for education for sustainable development in educational institutions globally and locally, it is fitting that early childhood schools are turning to vegetable gardens as a source of enhancing learning. During this process, the teachers interviewed observed that a stronger sense of environmental awareness and social responsibility becomes a reality.

## Increase in Environmental Awareness by Getting Tiny Hands Dirty!

Kos and Jerman (2019) believed that the modern child had little contact with nature. However, nature is a potent avenue for learning how ecosystems function and why the natural environment is valuable to humans and to all aspects of our economy and society. Environmental awareness is at the helm of the greening campaigns of the United Nations. Considering the global environmental crises, especially climate change, the United Nations Environment Programme (UNEP) has been promoting the greening of school curricula worldwide, guided by the mission statement — “Embrace a life-long learning approach that integrates climate education into school curricula” (UNESCO, n.d.).

At the centre of the green curricula is the thrust to inspire action against the climate crisis

and other environmental issues. However, the UN still has a long way to go in providing the necessary resources for greening activities in Jamaican schools. It is concerning that although the Government of Jamaica outlines in its Vision 2030 document (Goal #4) that "Jamaica has a healthy natural environment," very few early childhood schools in the island have a vegetable/fruit garden. It is therefore apparent that for the UN's greening thrust and Goal #4 of Jamaica's Vision 2030 to become realities in our ECIs, more work is required.

In the interim, ECIs across the island, such as the one studied, will have to use their initiative to implement school gardens and other mechanisms in order to "green" pedagogy. As purported by Down and Ferguson (2022), the greening of curricula starts with a vision. Although the overarching vision of the Vision 2030 exists, each ECI must develop its own vision. For Down and Ferguson (2022, p.56), sustainable learning starts with "teachers and students having a vision of a world that is healthy, just and caring." For the teachers interviewed, teaching students about the importance of caring for the natural environment begins with raising their environmental awareness.

The teachers in this study made a concerted effort to integrate nature into their lessons through various means. Firstly, they made learning about the natural environment pragmatic, enabling students to develop stronger environmental awareness and responsibility through direct participation in garden-based lessons. Reverting to the theory to which this paper subscribes, Kolb's Theory of Experiential Learning, for learning to be meaningful and long-lasting, students and teachers must get their hands dirty. As seen in the previous section, the children, with the guidance of the teachers, planted crops such as ginger and beans. These crops were not only limited to the outdoor vegetable garden, but potted crops were also creatively included in the classroom space. The vegetables, spices, and fruits planted by the teachers and students were essential to maintaining food security, as excess

from the harvests was sometimes shared with parents. On a more regular basis, however, the crops were used in the school's cafeteria as part of meal preparation.

Through garden activities, students learn to plant and water crops and enjoy watching them germinate. The interviewees outlined that their involvement in these activities spurred critical thinking in the students, as they would oftentimes get curious and ask a variety of questions about the plants and the processes involved in caring for them as they grow. The honing of critical thinking skills amongst the students as they interact with the garden, aligns with Kolb's Cycle of Learning, which states that learning starts with having concrete experiences, followed by reflective observations and abstract hypotheses. This curiosity also mirrors Dewey's (1990) position that education must be active and constructive, where learners can explore and question their environment. The students also learnt about the value and practice of weeding and raking the garden. As detailed by Ms. Chester, using the enquiry method called role play was potent in instilling the practice of environmental stewardship. Her students were allowed to act as farmers who had to care for the soil and crops, which she deemed more effective than merely talking to them about it or watching videos. The researchers were surprised that students aged 3 to 6 years old were already aware of what composting is and how to create compost. It is interesting to note that the students, through the school's 4H Club, went on to win a national composting competition, serving as further inspiration to care for the environment.

The students have progressed beyond mere environmental awareness and are now environmentally responsible. "Environmentally literate people are more likely to become better stewards of their environment as they progress through the stages of awareness, concern, understanding, and action" (Blanchard & Buchanan, 2011, p.233).

The results also parallel the findings of Skelly and Zajicek (1998) and Vieira et al. (2022)

who reported that students involved in garden-based programmes displayed more positive attitudes towards the environment and were more likely to take the initiative to protect it. In this study, students not only learned facts about the environment, but also acquired a sense of ecological responsibility, which is consistent with the assertion of Blanchard and Buchanan (2011) that environmentally literate individuals are more likely to engage in sustainable actions.

In the discussion of Klein et al. (2021), the environmentally literate person not only knows the natural environment, but is characterized by environmentally responsible behaviour and commitment. A common thread that ran through the data gathered from all the interviewees was that they all saw a change in the behaviour of their students, even to the extent that they policed the garden and other students. If the younger children, for instance, uprooted any of the plants, the older students reported the matter immediately and also scolded them. Interviewees also reported cases of students becoming emotional when any of the crops got damaged. This level of care for the welfare of the natural environment is vital in transferring knowledge to the children's families who may not have had the opportunity to learn about sustainability when they attended school. The knowledge and skills of environmental care are also likely to stay with the children as they grow into adults, culminating in the creation of more environmentally responsible citizens. The ecological practices studied at the school could be extrapolated and applied to other ECIs in Jamaica and small island developing states with similar contexts.

### **Increase in Social Interaction, Responsibility and Medicinal Uses of Plants**

The move to incorporate gardening into the early child curriculum also impacted the development of social responsibility and interaction among the students. Moreover, gardens in schools are viewed by some scholars, such as Pollin and Retzlaff-Fürst (2021), as social and emotional spaces. Subsequently, these align with the

ECI curriculum and the nutrition concept of Go, Grow, and Glow. The garden itself represents a living classroom where students can learn about the benefits of different food items and develop healthy behaviour and values that would benefit them later in life.

Go, Grow and Glow concept in the EC curriculum; gardens increase awareness of the Glow Foods category, helping them to make healthy choices.

**Figure 3**

*The Concepts of Go, Grow, and Glow.*



The data collected indicated that students who participated in the gardening activities were on track to achieve the milestones of developing an increased sense of responsibility for their environment and social interaction amongst their peers, which aligns with the Concrete Experience stage of Kolb's (1984) model. In this stage, learning must include hands-on experiences as part of the learning process. The interviewees stated that students were assigned group tasks with each student being assigned responsibilities such as watering to care for the plants. Teacher observations revealed that this required students to collaborate as they were able to communicate and share responsibilities, thereby also fostering a sense of accountability and support among the groups. This collaboration aligns with Dewey's theory on learning from real-life experiences.

In performing these activities, students were learning how to work together and support each other as they tried to achieve a common goal—growing their plants to maturity. Kolb’s Experiential Learning Theory was evident in these instances where students were constantly engaged in hands-on activities relating to their garden. They were engaged in a continuous learning cycle where they take action, reflect on, think about, and apply all that their teachers have taught them. Students were able to do composting, planting, and monitoring of plant health which are concrete experiences. These lessons support children’s development at the early childhood level by enhancing their tactile and visual learning abilities.

Dewey’s (1990) constructivist principles align with these findings, as education should be an active and constructive process for the learner. Through the eyes of the interviewees, students were immersed in real-world activities that encouraged exploration, critical thinking to solve problems, and reflection. While interacting with each other, the soil, and plants, students built knowledge about the natural world and their role within it.

## Conclusion

The use of vegetable gardens in schools is undoubtedly a potent means of not only creating practical ways for children to connect concepts to real-life settings, but also to develop a sense of care for the natural environment. As revealed by this study, teachers at the early childhood level observed the integration of gardens in student activities, which also facilitated more fluid communication, social interaction, teamwork, and critical thinking among the children. Since edible gardens provide experiential learning for the students through activities such as planting, watering, harvesting and crop identification, more of these spaces should be implemented in ECIs. However, such implementation is not without challenges—foremost being the capital needed to purchase a variety of seeds, seedlings, topsoil, and tools. Additionally, within the context of climate change and its consequent lengthy periods of drought, schools in Jamaica and the wider Caribbean must arm themselves

with water tanks, drip irrigation, and other counter-drought mechanisms to ensure the sustainability of the gardens. The lessons learnt from this study should be of value to other ECIs in Jamaica. However, future studies should be conducted to explore children’s perceptions and experiences with school vegetable gardens.

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