

# Growing Greens, Growing Skills: Early Childhood Teachers' Perceptions of the Opportunities and Challenges of School Gardening in Rural Jamaica

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## Abstract

The need for innovation in early childhood education in Jamaica is critical. This study explores four early childhood teachers' perceptions of the benefits and challenges of school gardening at a rural infant school where they teach. Upon receiving clearance from the Mona Campus Research Ethics Committee, semi-structured interviews were conducted with the teachers. Applying Gardner's Multiple Intelligences theory revealed several learning opportunities in the findings. These include bodily-kinesthetic, interpersonal intelligence and, primarily, naturalistic intelligence. Naturalistic intelligence strongly correlates to environmental stewardship, crucial in the context of climate change and the need to advance sustainable education. Challenges perceived include financing for soil and organic inputs, the community water crisis, and the damaging effects of heat and drought. The data implies that school gardening is a feasible innovation for early childhood education, supplementing many of the needs identified by the current Reform of Education in Jamaica Report of 2021 (The Jamaica Education Transformation Commission, 2021).

*Keywords:* early childhood, innovation, environment, curriculum

## Introduction

As the complexities and importance of early childhood education become clearer through research, understanding what works in curriculum innovations in early childhood education is increasingly critical. Achieving the optimal benefits of education requires more than just attendance at school: Edwards (2021) links children's experiences to their human rights, socio-economic status, and societal costs, stressing the interconnectedness of

curriculum, process quality<sup>1</sup>, and pedagogy. . The 2021 report on the Reform of Education in Jamaica (the current driver behind Jamaica's national education transformation programme) underscores the need for curriculum innovation at the early childhood level to improve Jamaica's educational outcomes.

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1 Process quality, for example, refers to the quality of children's actual experiences in ECEC, particularly their interactions, relationships, learning opportunities, and engagement within the setting (Nguyen Thi Ngoc Ha et al., 2024).

Early childhood is a crucial stage for developing lifelong perceptual, motor, cognitive, language, socio-emotional, and self-regulation skills (Early Childhood Development Series Steering Committee, 2016). However, inadequate and inequitable early childhood programmes hinder this development (Walker et al., 2017). The 2021 Report on the Reform of Education in Jamaica (The Jamaica Education Transformation Commission, 2021) highlights the need for innovation at the early childhood level to move away from didactic methods, which currently emphasise writing as a fine-motor skill and learning activity. The Report indicates that only a third of early childhood institutions implement developmentally appropriate practices, and only 5% have flexible plans to meet the individual needs of children. According to the document, many institutions also need programming which supports gross motor development, conflict resolution, socio-emotional development, creative development, or scientific activities. The lack of play space, play equipment, and learning resources has long been identified as a hindrance to learning in Jamaican early childhood institutions (ECIs) (McDonald & Brown, 1993, as cited in Davies, 2008), in addition to the challenge presented by crowded classroom conditions (Davies, 2008). These factors underscore the need for local and accessible innovations that naturally address diverse developmental needs. Nature-based programming includes the facilitation of learning outdoors in any of a variety of natural environments. School gardening is an example of nature-based programming. It offers promising alternatives to conventional academic teaching, while also addressing two pressing issues: climate change and social development (International Commission on the Futures of Education, 2021).

Globally, interest in nature-based programmes and their positive impact on holistic development and school readiness is growing (Cordiano et al., 2019). Soltero et al. (2021) argue that not only is school gardening in early childhood an age-appropriate way for children to be physically active, but it also enhances children's knowledge of nutrition, as well as their social and academic skills. The researchers' observations of children learning in nature have revealed the potential for profound and meaningful developmental

experiences. School gardens offer hands-on outdoor learning experiences rich in possibilities to help develop scientific concepts, pro-social behaviour, environmental stewardship, creativity, and healthy choices.

In response to the adverse effects of climate change, Jamaica has embarked on various green initiatives through the establishment of the Ministry of Land, Environment, and Climate Change, as well as the Forestry Department's National Tree Planting Day. These initiatives, however, do not account for any curricular programming in schools. The United Nations Educational, Scientific, and Cultural Organization (UNESCO, 2024) has proposed that this age group requires a greening of education that, from the roots up, supports deep knowledge, skills, and attitudes related to the environment through ongoing experiential learning supported by curriculum in alignment with the United Nations Sustainable Development Goals. The concept of greening the curriculum emerged in conjunction with the concept of greening education, involving the literal greening of schoolyards to cultivate children's holistic development and ground this development in environmental awareness and stewardship (Green, 2012).

Little is said in The Jamaica Education Transformation Commission's Report (2021) about potential curriculum innovations. Furthermore, there is a lack of research on innovations for Jamaica's early childhood education sector that could contribute to the discussion on what may be the best and most feasible options, considering the shortfalls in holistic learning outcomes disclosed by the 2021 Report. This study aims to meet this gap in Jamaican research on curricular innovation in early childhood education by exploring school gardening as an innovative means of complementing in-class lessons.

The gap takes on new significance when the United Nations Sustainable Development Goals are considered. The Roadmap for Implementation of Sustainable Development Goals in Jamaica (Planning Institute of Jamaica et al., 2017) makes no mention of how Goal 4 (High Quality Education) is to be achieved or recognized. This roadmap explicitly states that "Target 4.7 on ensuring that all learners acquire the knowledge and skills needed to promote sustainable development has

no equivalent” (Planning Institute of Jamaica et al., 2017, p. 17). Yet Gayle (2011) highlighted that education for sustainability had the ability to advance several of the goals of Vision 2030, including that of world-class education and training. In 2024 UNESCO’s goal in relation to the United Nations Sustainable Development Goals was for 90% of countries to have a green national curriculum (UNESCO, 2024). When and how will Jamaica take advantage of a more green and sustainable approach to education? There is space to create clarity with regard to innovation, sustainability, and methodology. Perhaps we can start by understanding the efforts already being made by local teachers and the impacts they perceive.

As Ferguson et al. (2021) note, teachers’ perspectives are critical because they are the change-makers on the ground, although they are often excluded from knowledge production — another gap in this area of research. This study addresses the gap by using a qualitative approach to investigate teachers’ perspectives at a rural early childhood school in Jamaica with a gardening programme. The research seeks to provide insights into the perceived benefits and challenges of school gardening, thus contributing to discussions among educators, policymakers, and researchers on innovating early childhood education in Jamaica and the wider Caribbean.

### **Statement of the Problem**

Early childhood institutions in Jamaica often lack the diverse range of resources necessary for holistic development, which contributes to suboptimal educational outcomes in a variety of ways. Despite the great need for innovation, there is a notable lack of research from Jamaica and the Global South on innovation at the early childhood education level. Rich local information is needed to guide evidence-based decisions on implementing practical innovations such as school gardening that may be able to meet a host of developmental needs effectively.

### **Purpose of the Study**

This qualitative case study explores the perspectives of four early childhood teachers at a rural infant school on their school’s gardening initiative. It aims to understand

what they perceived as the beneficial learning opportunities stemming from school gardening and the challenges they faced in implementing the project.

### **Location of the Study**

The study involved teachers at an infant school in rural Jamaica. The school is located in a north-western Jamaican parish in a community where small farming was common and access to regular piped water challenging.

### **Research Questions**

The two broad research questions that guided this study were:

1. What learning opportunities for the children have teachers perceived as a result of implementing school gardening?
2. What challenges do teachers perceive in implementing and sustaining the school gardening programme?

### **Theoretical Framework**

Gardner’s Multiple Intelligences (MI) theory provides a framework for interpreting the findings of this study. This theory posits that individuals possess several types of intelligence influenced by individual and cultural factors (Morgan, 2021). Originating from the psychobiology of the individual, several intelligences or computational abilities emerge, giving one the aptitude to solve problems or create products consequential to the cultural setting or community in which the person resides (Gardner, 2006). These abilities have identifiable neural problem-solving frameworks (core computational abilities that are identifiable in the brain) and are stimulated into action by the environment. Gardner (2006) goes on to indicate that an intelligence can also be encoded in a symbolic system, although it may be developed without one. According to MI theory the intelligences are musical, bodily-kinesthetic, logical-mathematical, linguistic, spatial, interpersonal, intrapersonal, and naturalistic.

Multiple Intelligences theory states that each person possesses all intelligences, but to varying degrees. The different experiences individuals have and the varying experiences of environments affect what their profile of intelligences will be. Possessing a strong

intelligence does not guarantee the intelligent application of that strength (Gardner, 2006). Furthermore, a person can exhibit very high intelligence in one aspect without it carrying over to another (Gardner & Hatch, 1989); and an individual can use more than one intelligence to solve a problem (Moran et al., 2006). The importance of experience and environment, as well as the ways that intelligences can interplay highlights the potential importance of diverse learning opportunities for children. Indeed, a key suggestion from theory proponents is that rich experiences should be a priority in planning, rather than attempting to generate a lesson plan for each intelligence (Moran et al., 2006).

The unique profile of intelligences that a person demonstrates can indicate natural strengths to be explored and cultivated in educational and career pursuits. According to Desmond et al. (2002), Gardner states that just as children possess a natural capacity to master language, they also possess a natural desire and capacity to explore and act in nature. Gardner and Hatch (1989) found that children as young as 4 years old demonstrate distinctive profiles of strengths and weaknesses across diverse constructs, making the theory relevant to early childhood education. This theory is also relevant to exploring the learning opportunities offered by school gardening, as it accounts for human relationships with nature and supports diverse learning experiences.

While there is an ongoing discussion presenting general and multiple intelligences as completely opposed, evidence suggests that the two complement each other, as demonstrated through comparative testing (Almeida et al., 2010). The correlation of multiple intelligences with the general aims of holistic development and the balance it appears to provide to prevailing conventional understandings of intelligence has prompted MI theory to become a vital contributor to discussions on educational programming and its value (Morgan, 2021). Sternberg (2007) highlights that Gardner's theory also does well in identifying different ways intelligence can manifest across various cultures and contexts, providing a window into understanding and valuing learning and thought that may or may not be conventional. Applying Multiple Intelligence

theory to the findings of this research will help identify the nature of the learning opportunities presented by school gardening, the scope of those opportunities, and whether and how any challenges that face implementation may relate to learning opportunities.

This theoretical framework is suitable as it not only accounts for learning connected to traditional academic ideas (such as language and mathematical thinking) but also to other aspects, including interactions with nature (K. Davis et al., 2011). Multiple Intelligence theory presents an alternative framework to the concept of general intelligence and the rote learning and standardised testing associated with it (Morgan, 2021). It also appreciates the benefits of active learning and the impact of diverse contexts on strengthening different types of intelligence (Morgan, 2021). As will be discussed later in this paper, various learning opportunities may be presented in the outdoor environment, given its contrast with the typical modern classroom.

## Significance of the Study

This study helps fill the gap in research from the Global South regarding early childhood curricular innovation and outdoor learning, and it can also inform policymakers and educators about the potential of school gardening to support holistic development in early childhood. In addition, this study provides data that can assist in crafting and selecting curricular innovations to enhance educational outcomes and address the challenges faced in implementing the school gardening programme — thereby providing further insight into making sustainable programme decisions. Finally, a study of this nature should be of value to the selected school and to schools with a similar demographic and geographic context, as it provides recommendations that could help them improve their gardens and students' learning experiences.

## Literature Review

Implementing nature-based programmes in early childhood education has garnered attention for its potential to enhance children's learning and developmental outcomes. Sustainability education, of which environmental and

agricultural education is a part (UNESCO, 2024), is specifically cited as an aspect of high-quality education (as conceived by the United Nations Sustainable Development Goals). Along with facilitating higher order skills, execution occurs through content and intentional experiences facilitated by trained, aware teachers — as opposed to remaining at the conceptual stage (Samuelsson & Park, 2017). This literature review examines the emergence of school gardening as an innovative practice, the benefits associated with it, the relationship between Gardner's theory and holistic development, the significance of teachers' perceptions, and the challenges involved in implementing school gardening.

### **Background on School Gardening**

A school garden is defined as a natural space for learning and experience where children actively participate in cultivating plants (Pollin & Retzlaff-Fürst, 2021). While agriculture is an ancient practice, school gardens continue to be innovative in the field of education. Cutter-Mackenzie (2009) highlights the rising global popularity of school gardens, noting the methodology's historical presence outside mainstream education and its perception as an opportunity to provide something more than what the conventional classroom typically offers. Lavrinovica (2021) provides an extensive review of the history of school gardening, highlighting its goals of connecting children with nature, cultivating happiness, providing healthy food, and, at times, generating income.

One of the earliest references to gardening-type activities in schools in Jamaica is the Government's effort to train boys and girls in agriculture and trades, all in response to the 1938 riots (Sherlock, 1942). Indeed, the 4-H Clubs took root in Jamaica through an Act of Parliament in 1940. Before independence, Jamaica's 4-H Clubs had the second-highest enrolment in the Caribbean (along with one of the lowest funding caches) (Jones, 1962).

Formalised programming for young children in Jamaica began in 1973 with the introduction of the very detailed Project for Early Childhood Education (PECE) Curriculum (Dudley Grant Memorial Trust, 2010). The PECE aimed to provide holistic development by supporting several subjects, including music. One of the resource

documents associated with the PECE Curriculum was revised and titled *The Hidden Curriculum in the School Garden* (Gaynor-Jones, 1994). However, these documents are only available in limited quantities on-site at the Dudley Grant Resource Centre. A more integrated curriculum replaced that document in 1993, and that was subsequently revised to result in the current Jamaica Early Childhood Education Curriculum (JECE) in 2008. However, the JECE does not include school gardening. The Dudley Grant Memorial Trust's Pilot Biodiversity in Basic Schools Project, launched in 2012, aimed to integrate environmental education in 20 basic schools, but did not proceed beyond the pilot phase (Dudley Grant Memorial Trust, n.d.).

Nature-based programming is also a tool to counter the psychological and social legacies of colonialism, which adds to its relevance today. Escayg and Kinkead-Clark (2018) argue for decolonising Jamaica's early childhood education practices (through Caribbean-centred interventions built around cultural knowledges, creolization, as well as resistance) due to the hegemonic and psycho-culturally damaging effects of the colonial experience. Indeed, the human relationship to nature is a core tenet of Indigenous philosophy and culture in a way that mainstream curricula often overlooks (G. Cajete, 1994; G. A. Cajete, 2013). Acharibasam and McVittie (2022) highlight the prevalent indigenous view that nature is, in fact, the teacher, introducing a different realm of possibilities in emergent and planned curriculum for approaches to learning, teaching, and content. This scope highlights the need for current evidence to explore outdoor learning in Jamaica, which can cover the spectrum from teacher-led school gardening through to child-led discovery learning, and to support understanding of how to innovate school programming effectively.

### **Benefits of School Gardening**

The available literature shows that school gardening programs offer numerous benefits and learning opportunities. Soltero et al. (2021) found that 5-year-olds in a standards-based programme became more physically active and advanced in vocabulary development. McCarty (2013) notes that school gardens can enhance the effectiveness of teaching, facilitate

opportunities for physical activity, and promote healthy eating habits. According to McCarty (2013), the benefits also extend to enhanced science and mathematical capabilities, as well as greater job satisfaction among teachers. Desmond et al. (2002) agree that school gardens integrate various subject areas, such as science, and deepen children's understanding of natural systems (for example life cycles by way of first-hand observation and interactions), as well as their sense of environmental responsibility.

There is extensive documentation to demonstrate the array of beneficial opportunities for children's learning and development that school gardening provides. Pope et al. (2023) state that school gardens effectively meet children's needs for autonomy, positive emotions, and cognitive renewal. Rymanowicz et al. (2020) highlight the development of language skills, interest in nature, and increased communication at home. School gardens promote emotional and social competence, with observations of more pro-social behaviours (Pollin & Retzlaff-Fürst, 2021). Cordiano et al. (2019) found that children in quality nature-based programs are as ready for kindergarten as their peers. Thus, whether from a cognitive, physical, or affective domain, there is reason to explore this approach as a holistic curricular innovation that may be effective.

Cutter-Mackenzie's (2009) exploration of Australian teachers' perspectives on a multicultural child-centred school garden highlighted that, as a space for interaction, it facilitated pro-social cultural exchanges and improvement in the learning of English. The children in that study reported enjoying being outside in the garden so much, specifically as an alternative to classroom learning. Gardening allowed them time to "slow down" (Cutter-Mackenzie, 2009, p. 131), and they expressed a wish that the practice had been implemented long ago. These findings indicate a sense of enthusiasm, hinting at a connection to Gardner's concept of naturalistic intelligence. Blair (2009) highlighted the organic nature of school gardens as the very thing that fostered a sense of wonder and promoted student learning production, rather than merely consuming information. Wake (2008) suggested that giving children a greater voice in garden planning could enhance their development and sustainability. Skelton et al. (2020) found a positive effect on

healthy food choices from early childhood school gardening in their wide review. However, they noted that at the early childhood level, more research focused on the effects related to nutrition. Therefore, there is room for more research on other developmental and academic outcomes stemming from early childhood gardening.

The researchers were unable to find local literature related to the effects of early childhood or primary school gardening in Jamaica, nor was there much available from elsewhere in the Global South. One such study is that of Puspita et al.'s (2024) case study on school gardening at the early childhood level in Indonesia, which found that regular engagement with the activity appeared to support children's environmental awareness and sense of responsibility. The programme was met with enthusiasm on the part of teachers and children, indicating the promise of the innovation to be established and effective.

### Teacher's Perceptions

The teacher is the leader, primary caregiver, and implementer of school programming within the classroom. Chappell and Szente (2019) emphasise that teachers' perspectives are vital due to their closeness to classroom decision-making. Chin (2014) explored the perspectives of Jamaican early childhood teachers, finding that their belief systems and personal cultures significantly influenced their classroom practices. This influence underscores the importance of understanding teachers' perspectives, as they represent values that can supercede formal education or traditional teacher training concepts. Engdahl and Ärlemalm-Hagsér (2008) emphasized the importance of the teacher's role in nature-based settings as the one who determines the scope and location of experiences young children will have in a programme. They further encourage teachers' keen observation of and response to children's explorations and curiosity as inspiration for what is facilitated. Even in a field such as early childhood education for sustainability (ECEfS) which seeks to create change and push boundaries, teachers' selection of what to practice is also influenced by external factors such as mainstream culture and parental fear (Ginsburg & Audley, 2020) — teachers' perspectives are not a monolith, and have a variety of motivations and expressions.

In one Florida study on teachers' perspectives on school gardening (Skelly & Bradley, 2000), 71 teachers gave their reasons for using the school garden as environmental education (97.1%); helping children learn better (84.3%); hands-on learning (72.9%); personal love of gardening (67.1%); and being encouraged by the administration (54.3%). These findings indicate that a broad range of possibilities awaits in the school garden, in addition to internal motivation for teachers. Cutter-Mackenzie (2009) found that Australian teachers viewed school gardens as spaces for cultural exchanges and improving English learning. These findings indicate a positive response from teachers, which is significant as teachers implement school programming (Ferguson et al., 2021).

However, classroom (or garden) decision-making is not all based on teachers' perspectives: children's knowledge is also important. Mitranić et al. (2019) point out that sustainable education in relation to the United Nations Sustainable Development Goals has in its framework the recognition of the child's agency, ability to create change, and ability to engage in critical thinking and dialogue with the teacher. Cullen (1999) suggests that because children bring knowledge with them, it is essential for teachers to have an in-depth understanding of subject content to facilitate deep engagement in learning. Chen et al. (2014) indicate that teachers' perceptions of knowledge, knowing, and their own efficacy play a significant role in shaping teaching approaches and children's experiences. In the case of this study, by understanding what teachers perceive as beneficial or challenging about school gardening, we open a window into what they note to be of value developmentally; the types of knowledge they foster; and what obstacles could be preemptively addressed before broadening access.

### **Challenges in School Garden Implementation and Sustainability**

The primary challenge that school gardening faces may be its lack of mainstream status; however, challenges are also evident within existing programmes. Skelly and Bradley (2000)

found that teachers spent only one hour per week in the garden, possibly due to the young age of the gardens, a lack of administrative support, or issues with curriculum integration. Teachers' preferences may also act as a challenge, as Blair (2009) suggests that teachers who prefer predictability and classroom cleanliness may be reluctant to engage in school agriculture.

Access to administrative and other support systems also appears as a barrier in other studies of school gardening. Hoover et al. (2021) identified administrative and district support, funding, training, curriculum, and leadership as essential for successful school gardens. J. N. Davis et al. (2023) found that inadequate administrative or regional support can negatively affect school garden sustainability. Heulskamp (2018) stated that many school gardens fail due to a lack of funding, which affects supplies, equipment, training, space, and access. Ohly et al. (2016) in a review spanning the UK, US, and Australia noted that reliance on volunteers could also pose a threat to sustainability, as well as the identification of concerns about work-load and the challenges of integrating gardening into already full schedules. Training and curriculum support could address this challenge by aligning gardening with curriculum requirements. For example, the Texas-based programme studied by J. N. Davis et al. (2023) integrated a gardening curriculum with the state curriculum, resulting in improved reading scores.

This study aims to understand the learning opportunities and challenges of school gardening from teachers' perspectives, providing practical insights for planning at multiple levels, especially in Jamaica. While nature-based programming is acknowledged as appropriate due to the impending climate crisis, our focus for this study will be on learning opportunities in relation to the general goals of a holistic education.

### **Methodology**

This research employed a case study design, as it is a comprehensive and holistic analysis and strategy of inquiry (Peel, 2020). The research aimed to reveal and understand teachers' perceptions, and the depth of the case study enabled this

process to occur. This qualitative case study employed semi-structured interviews to explore teachers' perceptions of the effects of school gardening on children's learning opportunities and the challenges faced in implementing these programmes. As Mojtabed et al. (2014) suggested: semi-structured interviews allow for collecting participants' knowledge relevant to the topic, while allowing discussion to reveal deeper meanings. The guides for the semi-structured interviews were constructed as part of a larger research project. The Mona Campus Research Ethics Committee approved the proposal for the umbrella research following the revisions and safeguards required by the approval process. Informed consent was sought from the teachers by having a telephone conversation to informally share the purpose of the research, the general questions, and assurance of anonymity in record keeping and reporting. Informed consent was received verbally at the beginning of the recorded interviews utilizing the text at the beginning of the interview guide. Interviews were conducted with four of the six teachers at the school. The interview guide is attached in Appendix 1. As the case study is collective, the triangulation among the four participants provides a degree of trustworthiness (Stahl & King, 2020).

## Participants

The participants were four early childhood teachers from a rural infant school who practised school gardening. The selection criteria included teaching children ages four or five. The sample consisted of four female teachers with 4-26 years of teaching experience. The participating teachers' names remained anonymous for confidentiality and as part of the informed consent agreement. For this study, the participants were referred to by pseudonyms, such as "Ms. Elizabeth", "Ms. Chester", "Ms. Thomas", and "Ms. Ann." Ms. Elizabeth is in the 30-39 age group and had been teaching for four years; all with the current basic school. She taught five and six-year-old children. Ms. Elizabeth was aware of the school garden even before she began working at the school, and thought the garden was established "for the educational ... benefit they can learn about the plant's life cycle, the nutrients, and the environment."

Ms. Chester was in the 50-59 age group and had been a teacher for over 20 years. She began teaching at this school in 2021 and teaches 4- and 5-year-olds. Ms. Chester had years of experience in the 4-H Club as a student and as a leader. This experience motivated her to invest time in the school garden and to revitalise the school's 4-H Club, allowing the children to compete in composting and school gardening. Ms. Chester had a "passion for 4-H" and wanted to bring an agricultural focus to the garden.

Ms. Thomas was in the 30-39 age bracket and had been teaching for 15 years. She began teaching at this school in 2023 and had a class of 5-year-olds. Ms. Chester shared that she "excelled in agriculture science in high school" and gardening was a passion of hers, so she decided to "take it on at the school", having seen the opportunity.

Ms. Ann was also in the 30-39-year-old age group and had been teaching for 15 years. She was completing her fourth year at the school. Ms. Ann taught 5-year-olds. Ms. Ann stated that the school's 4-H participation was one reason that the garden was maintained. She was motivated by the other teachers' love of farming and that they "came together to clean and plant."

## Data Collection

Qualitative data collection commenced after receiving full clearance from the Mona Campus Research Ethics Committee. The researchers collected data through online semi-structured interviews via Zoom, a video conferencing platform. Respondents were recruited through two gatekeepers<sup>2</sup>; and four of the six teachers opted to participate in the study. Each interview lasted 40-90 minutes, depending on the participant's desire to expand on their views. The questions built camaraderie by first asking about the teacher's motivation for being involved with the school garden, before focusing on questions related to teachers' perceptions of the potential learning opportunities provided and the possible challenges they faced in its implementation.

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<sup>2</sup> Gatekeepers facilitated access to potential participants (Dahlke & Stahlke, 2020). The principal introduced a teacher who became the main contact and invited staff to participate. Of the six eligible teachers, four voluntarily participated. This process was necessary because the researchers did not have direct access to the teaching staff.

## Data Analysis

Interviews were transcribed verbatim, using Microsoft Word's transcribe feature to process the audio recordings downloaded from the Zoom platform. The transcripts were then perused and edited to improve accuracy by listening to the audio while making corrections. Following this, through familiarisation with the data by reading and rereading, codes were then generated iteratively, allowing for the emergence of themes (Peel, 2020). The themes were then further organised as learning opportunities categorised deductively according to Gardner's multiple intelligences theory, and the perceived challenges were generally grouped. As Peel (2020) accurately notes, the researcher is actively involved in interpreting the findings; therefore, for clarity and to respect the teachers' voices, direct quotes were included in this research. This practice has long been acknowledged as a means of providing the thick, rich descriptions popularised by Geertz (1973, as cited in Stahl and King, 2020) to contribute to the value and trustworthiness of qualitative studies.

## Limitations and Delimitations

The hallmark limitation of using a qualitative design is that the findings may not be generalisable, as they are specific to the context of the participants. Furthermore, the research did not explicitly seek the views of other stakeholders which, along with the reliance on self-reported data, may have introduced bias.

## Findings

### Learning Opportunities Perceived by the Teachers

The teachers related several learning opportunities, presented here as themes aligning with Gardner's theory of multiple intelligences. The data yielded much related to the naturalist, bodily-kinesthetic, interpersonal, linguistic, and intrapersonal intelligences, and comparatively less in relation to logical-mathematical, musical, and spatial intelligences. K. Davis et al.'s (2011) outline of the intelligences guided the analysis.

### Theme 1: Development of Naturalist Intelligence

Naturalist intelligence is "an ability to identify and distinguish among different types of plants, animals, and weather formations that are found in the natural world" (K. Davis et al., 2011). In this study, several instances of naturalist intelligence were shared by all the teachers. The children were "fascinated" by watching the ripening of the fruit, and they checked and reported soil moisture levels "without being prompted", indicating innate motivation. Ms. Elizabeth said, "... they're excited to know about nature ... they would be glad to be outside when it's gardening time." Various plants were grown, and the children observed different growth cycles. Ms. Thomas indicated that it was beneficial for the children to observe "changes and the processes these food crops go through and their cycles". Among the crops were bananas, yams, tomatoes, pineapple, watermelon, and more. The children also learned to identify and distinguish among seeds, even entering seed knowledge competitions. Ms. Elizabeth affirmed that involvement in the garden helped children know "the difference between a root, or a leaf, or a stem."

Ms. Chester noted that the children learned to care for and appreciate their environment. Demonstrating another level of distinction among plants, Ms. Thomas also taught the children companion planting<sup>3</sup> for preventing pests and enhancing yield quality through "topping" and "pruning". The children learned which plants could be harmful and how to handle them. For example, Ms. Thomas related stopping a younger child from picking a pepper, which immediately created a teachable moment for the class on the dangers of handling pepper and then touching the eyes. Ms. Chester likewise affirmed that the children "know which plants to touch and not to touch."

Ms. Chester shared how they referenced their knowledge of plant growth and asked questions. She also highlighted the practical benefits of observing plant growth firsthand, which helped children remember the concepts. Ms. Elizabeth stated that the time allocated for the garden

<sup>3</sup> Companion planting involves growing different crops together in ways that can provide complementary ecological benefits (Cryan et al., 2025).

was complemented by the fact that different children learn at different paces, and the garden facilitated their learning processes. Ms. Ann believed the effect of the gardening experience would be lifelong, instilling a love for gardening in the children and possibly making communities more food secure. Ms. Ann also explained that children understood the concept of conservation, learning to “always try to have for tomorrow.”

### **Theme 2: Development of Bodily–Kinesthetic Intelligence**

Bodily–kinesthetic intelligence is “an ability to use one’s own body to create products or solve problems” (K. Davis et al., 2011). Each teacher referred to the children’s physical involvement in gardening several times. Ms. Chester reflected, “Hands-on experience is better because it’s practical. They get a chance to do. They will not forget.” Ms. Elizabeth shared that physical activity in the garden was more effective than technology-based learning. Ms. Chester explained that hands-on experience in the garden was better for learning than watching videos. In Ms. Thomas’s class, children watered in daily shifts. Children from the different classes were involved in digging holes, planting seeds, watering seeds, composting, and weeding. The children were taught about pruning and the composition and function of organic pesticide sprays; however, for safety purposes, they were not allowed to cut plants or make the spray.

### **Theme 3: Development of Interpersonal Intelligence**

Interpersonal intelligence is “an ability to recognise and understand other people’s moods, desires, motivations, and intentions” (K. Davis et al., 2011). Gardening was a group activity, and the children cooperated and communicated to accomplish various tasks. Ms. Thomas shared that the garden fostered meaningful conversations and helped children make connections between foods at home and those in the garden, also saying, “... this ties in social and even emotionally, the conversations they have with each other while they’re in the garden attest to this.” Ms. Ann noted that the garden really helped to bring the children together, as

well as their colleagues, promoting knowledge sharing, self-expression, and discussions about their activities. Ms. Chester shared that the garden motivated communication and social skills, encouraging cooperation among children. Ms. Ann thought there could be even more depth of interaction if the age groups worked together in the garden.

### **Theme 4: Development of Linguistic Intelligence**

Linguistic intelligence involves “an ability to analyse information and create products involving oral and written language” (K. Davis et al., 2011). Children practised oral language using Standard Jamaican English to share their observations and ask questions. They made home-school connections by discussing foods they carried to school and those growing in the garden. Ms. Ann noted that children had the opportunity to tell stories about their favourite plants. She shared that gardening improved critical thinking skills because the “children think outside the box ... ask questions about what they’re interested in.” Ms. Chester emphasised that gardening improved critical thinking, “One hundred percent! ... because we started the garden some time ago, and the nature walk where they talk about the garden, what they see or whatever”.

### **Theme 5: Development of Logical Mathematical Intelligence**

Logical–mathematical intelligence is “an ability to develop equations and proofs, make calculations, and solve abstract problems” (K. Davis et al., 2011). Children were observed counting objects in the garden and occasionally sorting and grouping them. Ms. Thomas mentioned that children counted fruits and vegetables and reported their findings without prompting. Ms. Elizabeth referred to children identifying differences in plant size, and Ms. Ann spoke about children grouping and sorting. Ms. Thomas brought the children’s attention to her watering log, which was a conceptual way to be aware of measurements relating to time; however, in a more hands-on sense, the teachers did not explicitly invite children to share their observations of quantity comparisons.

### **Theme 6: Development of Musical Intelligence**

Musical intelligence comprises “an ability to produce, remember, and make meaning of different patterns of sound” (K. Davis et al., 2011). Ms. Chester mentioned the use of songs to introduce a lesson. Ms. Ann stated that being in the garden inspired creating songs.

### **Theme 7: Development of Spatial Intelligence**

Spatial intelligence is “an ability to recognise and manipulate large-scale and fine-grained spatial images” (K. Davis et al., 2011). Though there were references to the use of space in the garden, none indicated that the children’s feedback was sought or incorporated. References were made, however, to the identification and act of sorting plants in the garden by colour.

### **Theme 8: Development of Intrapersonal Intelligence**

Intrapersonal intelligence involves “an ability to recognise and understand one’s own moods, desires, motivations, and intentions” (K. Davis et al., 2011). Ms. Thomas noted, “I have seen social and emotional development in terms of how to take responsibility for taking care of plants”. Ms. Ann affirmed that it “teaches them to be responsible outside of the classroom,” mainly because the garden is ongoing, “it helps them to understand the importance of caring”. Ms. Chester shared that children showed self-control in the garden because instead of damaging plants, “they say, well, it’s an important plant. I can’t pull it up”. Ms. Elizabeth noted that children knew fruits were healthy and good for them.

The teachers noted the children’s enthusiasm for the garden and also spoke of observing the children and noticing when an unplanned visit to the garden may be best for their mood. However, it was never said whether the children were invited to be aware of their moods.

### **Challenges in Implementation and Sustainability Perceived by the Teachers**

The teachers identified several challenges in implementing school gardening programmes. Teachers cited limited resources, such as supplies,

water/heat, and human resources, as significant barriers. Ms. Thomas identified the availability of soil and compost as significant challenges, saying, “... the school just doesn’t have the money to invest in compost,” and that having enough quality soil is the biggest challenge. Ms. Thomas shared that a lack of water and excess heat were issues that she tried to address by having parents donate mulch. Ms. Thomas also brought soil and compost from her home. Ms. Chester shared that space was a challenge, and to counter this, container gardening was used; the idea for this came from her knowledge of 4-H Club material.

Another challenge was the heat, Ms. Chester stated that “sometimes when the time is dry, you will lose the things that you plant”, even with placing bottles of water in the garden. She planned to invite a professional farmer to the school to help establish a hydroponic system in the garden. Ms. Chester said that more finances and resource persons were needed to assist, however. Ms. Elizabeth also pointed to water as a challenge. Due to the school’s success in securing a water tank from the National Water Commission, she suggested that the school reach out to more community organisations for assistance. Ms. Ann identified the challenge generally as “ensuring that the things needed to take care of the garden are put in place”. She suggested assigning persons to water the plants and coordinating among teachers and ground staff to water over breaks, especially. She also cited insects as a challenge. The teachers suggested that more organised input on their behalf, along with the involvement of the groundsman, would help offset the challenges of implementing and sustaining the school garden. The teachers felt they had the moral support of the principal.

### **Discussion**

Gardner’s theory proved its usefulness in this research by identifying which intelligences were being actively supported and areas where additional support could be provided. Naturalist, bodily-kinesthetic, interpersonal, and, to some extent, intrapersonal intelligence were the most supported, along with linguistic intelligence. This profile of intelligences perhaps mirrors the

concept of the young child as having agency, being someone to listen to, and being someone to be engaged with by adults as they think critically and grapple with hands-on challenges (Mitranić et al., 2019). Indeed, the evidence of enthusiastic, rich dialogue, initiative, self-awareness, and problem-solving was present in the data. At the same time, logical-mathematical, spatial, and musical intelligences revealed greater opportunities for fulfillment that could be better addressed when the reason for the variation is better understood.

Addressing more than one intelligence in this context supports previous research which suggests that gardens can foster diverse aspects of holistic educational development (Desmond et al., 2002; Cordiano et al., 2019; UNESCO, 2024). It also shows that school gardening may be a suitable innovation for Jamaica's needs (Puspita et al., 2024). However, in the literature, the most significant benefits of gardening were found in contexts where children had a greater role in planning (Wake, 2008); had free time in the garden (Cutter-Mackenzie, 2009); or had access to the school garden within the context of an in-depth and integrated garden curriculum — indicating ways that current programming could be expanded. The love and intrinsic motivation of the teachers in this study, as well as their previously honed knowledge, may be reasons that the curriculum did not arise as a challenge as it did in the literature (Hoover et al., 2021). Two teachers did mention the desire to draw more from 4-H Club programming to enhance the experiences and content of their garden-based learning activities. The openness of the teachers to exploring gardening techniques, particularly companion planting (an indigenous practice; Klopotek et al., 2022), indicates a curiosity about practical and ingenious solutions which could add another element of sustainability to programming.

A curriculum with school gardening interwoven throughout may support a more expansive range of learning opportunities, such as helping to plan the layout (spatial, logical-mathematical); comparing yields, or having the water log mounted on the wall (logical-mathematical); exploring sound creation and effects of sound (musical); creating art (spatial,

bodily-kinesthetic, intrapersonal; how to address climate-related issues (any or all intelligences); or learning metacognitive techniques (intrapersonal). How naturalistic, interpersonal, and intrapersonal intelligences are reflected in the findings reveals a supportive framework for the development of environmental stewardship, aligning with the literature's suggestions.

The challenges identified were practical obstacles concerning climate, resources, and human resources needed to keep the garden running successfully. The teachers often mentioned the children's enthusiasm. Their enthusiasm, the teachers' enthusiasm, and the perceived benefits have helped to keep the garden functioning. The teachers were motivated to bring in their resources and resource persons to find solutions to the challenges. Additionally, the teachers suggested that the school could seek more longstanding and formal partnerships with local organisations for resources and support, in addition to formalising and increasing in-staff communication. The teachers also considered exploring low-cost, yet effective indigenous methods. For example, the Taino practice of farming in *conucos*<sup>4</sup> (similar to companion planting) can help to retain moisture and combat heat (Atkinson, 2006).

## Conclusion

This study highlights the potential of school gardening to enhance multiple intelligences in students, especially naturalistic, interpersonal, and bodily-kinesthetic intelligences. Potential is evident in the varied ways the intelligences show themselves in the data. Support for the development of spatial, intrapersonal, and musical intelligences was also shown, although not in as fulsome a manner as the others given the lesser number of examples cited by the teachers. The variation in degree of depth means there may be potential to expand how learning is encouraged in school gardens. Given the holistic manner in which many intelligences are supported, this research reveals school gardening as a rich alternative or

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<sup>4</sup> Conucos are large agricultural mounds created on slopes for growing root and other crops, while improving drainage and reducing soil erosion (Chapagain & Raizada, 2017, citing Watts, 1987).

supplement to the conventional classroom and consumptive technology-based learning, and presents a beginning for further exploration into curricular innovation, overcoming challenges, and building on research presents a beginning for further exploration into curricular innovation and overcoming challenges.

### Curricular Innovation

Garden-based learning allows children room to grow, which adds to its promise. Samuelsson and Park (2017) emphasize the United Nations Sustainable Development Goals' specific highlighting of education for sustainability and higher order skills as hallmarks of high-quality education which should be available to all. Both of these hallmarks have revealed themselves in the findings of this study. For instance, sustainability education through the active engagement in growing and harvesting food and the transmission of cultural knowledge, and higher-order thinking through naturalistic, interpersonal, and bodily-kinesthetic intelligences and others. The findings indicate that continued efforts in nature-based innovation is a practical and intriguing prospect for advancing curricular innovation. UNESCO's (2024) curriculum greening initiative highlights the crucial roles of nature-based learning and deeper, empowering awareness of the environment as a lifelong pursuit vital to our survival. For nations seeking to advance educationally, it offers clear guidance on developing a green curriculum in connection with the Sustainable Development Goals, and affirms that vegetable gardening and composting are appropriate activities for young children to develop environmental stewardship through experiential and sensori-motor learning (UNESCO, 2024). For the urgent matter of addressing and coping with climate change, UNESCO suggests key topics for curricular integration such as ecosystems and biodiversity, sustainable lifestyles, and climate justice, among others — suitable for ages five years and up. Quality education cannot afford to exist in a vacuum as the planet copes with climate crises.

To innovate the Jamaican curriculum today, policymakers may even review the PECE and its accompanying resource document, *"The Hidden Curriculum in the School Garden,"* and examine the 4-H Clubs syllabus for ways to

incorporate gardening knowledge and skills into the curriculum. Considering these content sources, along with future research, could help bring about meaningful and positive change in the early childhood space, as well as contribute to creating a more sustainable future.

### Facing Challenges

Challenges to implementation, such as limited resources and coordination among staff, should be addressed in a practical manner through consultation among colleagues and administrative staff, and possibly with the input of parents. The next step would be greater cooperation around the needs at hand as suggested by the teachers, more community engagement for practical assistance, and fundraising as needed.

Regarding obstacles, future research may identify the most effective ways to overcome implementation and maintenance challenges by exploring the views and experiences of other early childhood institutions in Jamaica. The experiences of school gardening in other Caribbean countries may also prove insightful, especially considering the limited numbers of local early childhood institutions currently engaged in school gardening.

While this study did not address teachers' perceptions of children's roles specifically, high-quality nature-based education generally facilitates a more relational model of communication, with learning emerging through responsive, reciprocal teacher-child interactions rather than teacher-directed transmission of knowledge (Mitranić et al., 2019). Several instances of this kind of interaction are found in the data. This is opposed to the conventional top-down approach more associated with Jamaica's colonial heritage (Escayg & Kinkead-Clark, 2018). The need for teacher training that not only equips trainees with appropriate relational skills for the pre-school age group, but meaningfully expands the perceived role of the child becomes apparent. Relational skills can be embedded into teacher training through modelling, video feedback, and coaching that help teachers practise responsive, emotionally supportive interactions with young children (Brunsek et al., 2024). To help teachers recognize children as capable participants in educational decisions, participatory pedagogy

training, where teachers engage in and create reflective activities and opportunities to practise shared decision-making with children, could be appropriate (Akyol, 2025).

### Building on Research

Future research may analyse the data from this study using a different theoretical framework, such as experiential learning or climate change education, in order to provide depth of scope and broaden understanding. Research may also look into teachers' perspectives on Gardner's theory. Similar studies may be conducted in basic schools, as infant schools typically have fewer students and are better resourced, or in an urban school with a different community or cultural context from the rural environment. This research site could also be revisited and interviews conducted with other stakeholders.

Building on the importance of exploring stakeholder views, upcoming studies could investigate children's perspectives on school gardening in general; their sense of agency in the garden; what they think would enhance the school garden; or what they perceive as challenges. Researchers could also explore parents' perspectives regarding the perceived benefits of school gardening.

It may be helpful to explore in greater detail how the school garden supports the current curriculum, or vice versa, comparing this study's data with the JECE objectives. Subsequent review studies could compare the Jamaican Early Childhood Curriculum (JECC) with other curricula that more explicitly support the integration of gardening into learning year-round, such as UNESCO's Greening Curriculum Guidance (UNESCO, 2024); to explore ways to expand the JECC. Considering the decolonisation of education in conjunction with combating climate change, further research could also explore whether and how indigenous approaches to nature and early childhood education can offer greater insight into making school gardening meaningful and sustainable.

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## Appendix 1



### Interview Guide

#### Gardening and Its Impact on Students' Environmental Stewardship and Academic Performance

Date: \_\_\_\_\_

Time: \_\_\_\_\_

Interviewee (pseudonym): \_\_\_\_\_

Duration: \_\_\_\_\_

Interviewer: \_\_\_\_\_

Good day, I am ... from the University of the West Indies, Mona Campus, and I am conducting research on teachers' perceptions of the ways in which the use of vegetable gardens contributes to academic performance and environmental stewardship amongst young children. I am therefore inviting you to engage in this study by answering a few questions. Your involvement is totally voluntary, and you may withdraw from the study at any time without repercussions. Your data and identifiers will be protected if you participate in this study. Your name is not needed. Thank you very much.

## Questions

1. Gender: ( ) Male            ( ) Female
2. Age group:  
 ( ) Under 20  
 ( ) 20–29  
 ( ) 30–39  
 ( ) 40–49  
 ( ) 50–59  
 ( ) 60 and over
3. How long have you been a teacher?
4. For how long have you been a teacher at this institution?
5. What age group do you teach?
6. What is the size of your class?
7. How long has the garden been in existence at this institution?
8. Do you know what motivated your institution to implement a garden?
9. A. What are the crops cultivated in this garden?  
 B. Can you provide examples of specific topics that you teach when using the garden in your lessons?  
 C. How do you prepare for a lesson involving the garden (and in taking the students to the garden)?
10. A. In what ways do you integrate the use of the garden in your lessons/ how do you use the garden in your lessons to teach students?  
 B. What other interactions do you allow children to have with the garden?
11. A. Describe the extent to which the use of the garden aids in improving the academic performances of your students/how does using the garden help improve your students' academic performance.  
 Does the garden help your students do better in school?  
 B. Do you believe? And to what extent? Describe the extent to which the use of the garden aids in improving your students' critical thinking skills. What kinds of questions do you get from them while in the garden?  
 C. Describe the extent to which the use of the garden aids in improving your students' numeracy skills.  
 D. Describe the extent to which the use of the garden aids in improving your students' content knowledge of the lesson. Or how does using the garden help your students learn and remember the lesson content better?
12. Describe the ways in which the use of the garden aids the students' attitude toward the environment.
13. Are you faced with any challenges? If yes, what are the challenges faced with the use of the garden in teaching?
14. What strategies do you think can be utilised to improve the utilisation of the garden in increasing students' academic performance? How can the garden be better used to improve the students' academic performance?
15. What strategies do you think can be utilised to improve the utilization of the garden in making students more responsible and engaged in taking care of the environment?
16. What can the school itself do to improve the garden?

Thank you!

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