The Importance of Summer Gardening Activity to Promote Culturally Responsive Teaching: An Intervention of Early Learning Gap for Preschool Children

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ABSTRACT

Early learning gaps in preschool children can become a silent crisis that rapidly affects their later school life if they do not receive appropriate early intervention. Early learning gaps by family income, race, and ethnicity have persisted for decades, and recognizing that millions of young children have a "silent crisis" empowers teachers to identify effective teaching strategies; the implementation of culturally responsive teaching is effective in bridging these learning gaps. This study aims to point out the importance of summer gardening activities in promoting culturally responsive teaching as an intervention to address early learning gaps for preschool children. The 12 preschool children were the study's respondents via purposeful random sampling. The research design used in the study was descriptive-inferential. The data analysis utilized the following statistical measures: mean and standard deviation. The mean was used to define the data set in terms of the pupils' pre-test and post-test results from the researcher-made test form, and the standard deviation was used to determine the difference in the observed pupils' test results between the pre-test and post-test results. A paired t-test is used to establish the p-value and assess whether there is a statistically significant difference between two dependent variables or hypothesis testing from pre-test to post-test results. The finding of a P-value of 0.001 indicates a significant difference between the promotion of culturally responsive teaching during the summer gardening project and intervening in the early learning gap for preschool children. Therefore, the results revealed a highly significant difference in the developed academic skills of preschool children, such as numeracy skills, science concepts, literacy skills, writing skills, fine motor skills, creativity, gross motor skills, and critical thinking. And the results of a P-value of 0.002, which means that there is a big difference between the promotion of culturally responsive teaching during the summer gardening project and intervening in the early learning gap for preschool children, indicate a mean difference of -15.006 and a standard deviation of 1.912. Therefore, the results revealed a highly significant difference in the developed prosocial traits, such as helpfulness and sympathy for others, appreciating and respecting everyone's work, and history appreciation skills. Lastly, the results show a P-value of 0.001, which means that there is a big difference between the promotion of culturally responsive teaching during the summer gardening project and intervening in the early learning gap for preschool children, and the study's results indicate a mean difference of -13.007 and a standard deviation of 1.913. Therefore, the results revealed a highly significant difference in the development of strong connections among teachers, children, parents, and the community. With these findings, this study recommends that teachers always acknowledge the importance of doing summer gardening activities because gardening is widely considered a highly effective form of culturally responsive teaching and truly bridges the early learning gaps of preschool children.

Keywords: Learning gaps and Early Intervention, Descriptive and Inferential, Researcher -Made Questionnaires, Culturally Responsive Teaching, Preschool Children

INTRODUCTION

Early learning in preschool exposes a severe learning crisis on a worldwide scale: just 55% of children in the poorest households are developmentally on track, and over 300 million children (37%) are at risk of not meeting the minimum reading competency. Additionally, about 60% of children in low-income nations lack access to

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early childhood care and education (ECCE) due to the stark disparity in access, since high-income regions have high pre-primary attendance. Additionally, early learning gaps disproportionately affect children from low-income families, those living in rural regions, and those who speak a different language at home, exacerbating long-term social and economic disparities (UNESCO, 2024).

Preschool learning gaps are regarded as a serious global learning crisis. According to reports, over 300 million children globally are at risk of not being able to read at a basic level, and about 60% of children in low-income nations do not receive an early education. As a result, just 35% of children in poor countries receive early education, compared to 89% in rich countries. Early childhood care and education are the primary causes of early learning gaps, where 70% of 10-year-olds in underdeveloped nations are unable to read a simple text (UNESCO, 2024). For millions of young children worldwide, early learning gaps are a serious problem that can lead to severe learning deficits by the time they are ten years old (UNICEF, 2024). Additionally, almost 40% of children between the ages of three and six worldwide do not have access to pre-primary education, which contributes to widespread learning gaps or basic deficiencies (World Bank, 2024). By the age of ten, almost 70% of children in low- and middle-income nations are unable to read and comprehend a simple paragraph; these early learning deficiencies subsequently show up as severe "learning poverty" (World Bank, 2024).

Learning gaps in preschool children are not attributed to a single contribution but to several groundbreaking sociologists, economists, and psychologists who identified how environmental factors impact cognitive development. A book, Meaningful Differences in the Everyday Experiences of Young Children, by Betty Hart and Todd Risley (1995), disclosed the "30-million-word gaps," explaining that children from lower socioeconomic backgrounds are exposed to significantly fewer words and conversational interactions by age three than their wealthier peers. Dr. James Heckman shared a book and discussed how "skill begets skill," meaning learning gaps in both cognitive skills open up as early as ages 4 to 6 and widen, making early childhood interventions crucial (Mosokotso, P., & Wa Nkongolo, 2026).

The early learning gap has a lifelong impact because it impairs the brain and cognitive foundations in children; early childhood is a critical period for brain development, serving as a crucial window for establishing brain architecture. Gaps at this stage create a fragile foundation, making future learning, problem-solving, and literacy harder to master. Learning gaps, or missing foundational preschool skills, face higher rates of grade retention, lower high school completion rates, and an increased risk of failing to gain basic proficiency in reading and math. Early learning gaps considered as educational deficits compound over time, reducing adult employment potential, lowering lifetime earnings, and costing the global economy trillions of dollars. Early learning gaps lead to early adversity, which is associated with compromised physical and mental health in adulthood. Higher rates of learning gaps lead to early struggles, and these gaps correlate with compromised physical and mental health in adulthood, higher social exclusion, and limited civic participation (UNESCO Statistics on Global Learning Poverty, 2025).

Preschool learning gaps worsen quickly in the absence of early intervention. These untreated deficiencies in language, concentration, and self-regulation can result in persistent achievement gaps, behavioral problems, and chronic frustration as academic demands rise. These gaps eventually jeopardize future job opportunities and high school graduation. Early language difficulties can seriously impair children's reading comprehension and early math skills as they move through primary school, creating an academic decline. Early learning gaps increase the likelihood of school disruption and disciplinary problems in children who lack self-regulation or social-emotional skills. Early learning gaps raised the strain on special education since these students are more likely to need personalized education programs or be pushed back a grade in the absence of remedial support (Stephens, D., & Stephens, D, 2024).

Learning gaps refer to situations where children do not acquire certain knowledge or skills by a specific point in their education. It's like a gap in the knowledge or abilities of children. Learning gaps can occur in any topic and for various causes. By understanding what a learning gap is, teachers and parents can identify ways to help children catch up and learn what they missed. Various educational gaps can impact children's learning. Various educational gaps, such as knowledge gaps, occur when children lack the knowledge necessary to comprehend a novel subject. Occasionally there are skill gaps; children understand the concept but don't have the necessary practice. Children with communication gaps struggle to comprehend or successfully share knowledge.

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Additionally, environmental gaps occur when children lack access to educational resources or a quiet space for learning. By identifying these various learning gaps, educators and parents may better customize their support to each child's unique requirements (Cherry, K., McLeod, S., & OFFICE OF EDUCATIONAL IMPROVEMENT, 2022).

Learning gaps are obstacles that prevent children from moving closer to their objectives. People likely shudder at the phrase "gap" and "education" because they worry about who lacks knowledge or access. Formally speaking, learning gaps are differences between a child's performance and grade-level expectations that indicate a lack of mastery. Children may have learning gaps in a single academic area or in multiple areas. Some compare learning gaps to building blocks; you can see how the entire structure could be in jeopardy if one of the fundamental pieces is absent. Learning gaps are frequently defined as "the way things are" rather than "the way things should be (Stephens, D., & Stephens, 2024).

Early learning gaps, also known as preschool learning gaps, are crucial during a child's formative years. Their brain is most receptive to learning language, math, motor skills, and social-emotional cues during this time. The unsettling reality is that many children never catch up and are already years behind by the time they start kindergarten. A child's entire academic trajectory: These discrepancies, known as early learning gaps, can significantly impact a child's entire academic journey. These discrepancies, referred to as early learning gaps, can significantly impact a child's entire academic trajectory. By the age of seven, a minor delay in acquiring letters or counting can develop into significant issues with reading, writing, and self-assurance. Learning gaps can also result from a student's repeated absences from class because of family issues, a chronic illness, mental health issues, or learning difficulties. Academic standards, curricular intensity, class numbers, and the caliber of instructional leadership are all factors that a school can influence. In particular, school-wide problems such as assigning groups of kids to a less challenging curriculum, hazardous learning settings, and culturally hostile surroundings aggravate the gap (Selvaraj, 2023).

Early learning gaps are an emergency problem that goes unnoticed. Early learning gaps are frequently misinterpreted as immaturity or laziness, but they actually indicate that a child did not receive the proper early exposure or support. Typical reasons consist of the following: An excessive dependence on digital gadgets instead of paper-based learning, insufficient communication between parents and children about letters, numbers, and language, and poor hand muscle development that makes it difficult to hold a pencil all contribute to young children's inability to obtain necessary resources. Those make holding a pencil difficult, and young children who lack basic phonics, letter recognition, number sense, and motor control skills are already a significant struggle in school. Unfortunately, if no action is taken, the learning gap in skills will continue to widen and worsen. Inequalities related to disability, socioeconomic class, race, or family background would be strengthened and continue to affect children who are vulnerable to these factors if schools didn't take such action to close learning gaps. The outcome is a difficult-to-break and negative feedback loop that will always continue and affect the academic journey of the children (Landers, 2025).

And to eradicate the learning gaps, there must be an implementation of culturally responsive teaching because the absence of culturally responsive teaching can easily lead to a hostile or isolating preschool environment. Lack of cultural significance in the classroom might unintentionally marginalize young children, making them feel invisible or excluded. A child's first exposure to the outside world is frequently in preschool. A child may experience confusion, anxiety, or withdrawal if a teacher's rules, communication style, and teaching methods significantly differ from the child's cultural background. Diverse children may be in classrooms that solely adhere to the norms and models of the dominant culture, which may subtly marginalize them, leading to feelings of alienation. This situation can lead to feelings of alienation for children who are placed in classrooms that exclusively adhere to the norms and models of the dominant culture. Additionally, when educators are unaware of the cultural backgrounds of their pupils, they may perceive various play behaviors, communication styles, or reactions to authority as behavioral issues rather than cultural distinctions (Landers, 2025).

Culturally responsive teaching is crucial because over the past few decades, many classrooms have become more diverse. Children today come from a wide range of ethnic backgrounds, languages, traditions, and life experiences. This diversity offers teachers both possibilities and challenges. Traditional teaching methods, often based on a single cultural perspective, struggle to meet the needs of every child. Culturally responsive teaching

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has therefore emerged as a key tactic for creating inclusive and effective learning settings. An educational paradigm that acknowledges culture as a crucial element of learning is known as culturally responsive teaching. It highlights how crucial it is to relate academic material to children's cultural backgrounds (The Chicago Social and Character Development Trial, 2022). This approach encourages educators to view cultural differences as opportunities for enrichment rather than barriers (Selvaraj, 2023).

Teaching that is culturally responsive affirms children's cultural identities. Children are more likely to feel respected and involved when they see representations of their backgrounds, values, and viewpoints in educational materials. According to research, children who receive cultural affirmation are more motivated and do better academically. This sense of belonging is especially crucial for children from historically oppressed communities, who might otherwise feel cut off from educational settings. Beyond academic results, culturally responsive education has a significant impact. Children who receive an education in culturally sensitive settings become more socially conscious and enhance their critical thinking abilities. They gain the ability to negotiate cultural differences, have polite conversations, and comprehend various viewpoints. In a society that is becoming more varied and interdependent, these abilities are crucial. In this way, education becomes preparation for both civic engagements (Hudak, 2025).

Teacher awareness helps spot and allow teachers to identify effective strategies because teachers are skilled at identifying and filling in learning gaps before permanent dropout or failure risks set in. As a classroom teacher, it is my duty to respond to the changing needs of education by being inquisitive in the classroom and contributing to the evolving needs of the children in my care. And, in my preschool classroom for the school year 2025-2026, I have observed that summer gardening activity for preschoolers promotes culturally responsive teaching and can develop the academic preschool children's skills, including numeracy skills, science concepts, literacy skills, writing skills, fine motor skills, creativity, gross motor skills, and critical thinking. Additionally, it helps develop prosocial traits such as helpfulness and sympathy for others, as well as skills in appreciating and respecting everyone's work and understanding history. And building a strong connection among teachers, children, parents, and the community through gardening is widely considered a highly effective form of culturally responsive teaching. It bridges learning gaps by rooting abstract concepts in the lived experiences and cultural traditions of the children.

In gardening activities and experiences, children learn best through these, which also help bridge the learning gap. Gardening activities tend to be learner-centered, interest-based, flexible, and collaborative; they can be an inherently inclusive style of teaching. In actuality, regardless of the children's family background, program, or school, gardening has a continuous positive impact on learning both academically and in other ways. Gardening provides many learning opportunities for the children to explore and learn across learning areas, and children learn naturally. And, when children feel protected, seen, heard, and like they belong, they can learn best, and they are much more capable of learning (Jaminal, M. V, 2026).

Preschoolers can learn a lot about the natural world via practical activities and experiences when they garden. They engage in scientific activities to gain knowledge about the natural world. Planting and tending to flowers and veggies is a fascinating journey of learning and discovery rather than just learning about spring, plants (and their life cycle), and growth. Preschoolers may cultivate a garden of learning opportunities with the aid of this compilation of ideas. Particularly for preschool children, gardening with them is a fascinating journey of learning and discovery rather than just a pastime. Preschoolers who participate in garden activities develop a strong bond with nature, learn important life lessons, and cultivate healthy behaviors.

Additionally, gardening fosters collaboration among diverse groups, incorporates lessons on the history and significance of food in various cultures, encourages children to share traditional gardening practices from their cultures, and incorporates local plant species that reflect children's cultural backgrounds, all of which contribute to culturally responsive teaching. Additionally, gardening promotes children's motivation and connection to the environment and society, connects people and traditions, and incorporates children's cultural identities, making it an avenue for culturally responsive teaching.

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Objectives of the study

The objective of this study is to identify the importance of summer gardening activity to promote culturally responsive teaching in order to intervene in the early learning gap for preschool children.

Scope and Limitation of the Study

The study's results require careful and attentive evaluation due to certain limitations. The following points are important to note as limitations of this study.

First, a number of restrictions need to be taken into account. With only 12 children in the population, the sample size was tiny, which might have made it more difficult to identify smaller effects. The results may not be representative of all populations of preschoolers due to the small sample size.

Second, the duration of the summer gardening project may be too short to assess its long-term impacts on children's development and attitudes regarding the implementation of culturally responsive teaching; to fully bridge the learning gaps, future researchers should examine the effects of a long-term gardening project on preschoolers' attitudes and development of their academic skills.

REVIEW OF RELATED LITERATURE

According to various theories, including the Framework of Culturally Sustaining Pedagogy (2012), Place-Based Education (2004), and Experiential Learning and Constructivism (1984), gardening has the potential to promote culturally responsive teaching. Culturally Sustaining Pedagogy (2012) disclosed that gardening extends beyond being culturally responsive by actively fostering and sustaining linguistic, literate, and cultural pluralism within the learning environment, which school gardens can mirror by growing culturally significant plants. Place-Based Education (2004) found that gardening connects learning to the local environment and community history, using the garden as a living text that honors indigenous and local ecological knowledge systems. Experiential and constructivist learning (1984) disclosed that gardening will provide an opportunity to have centers of hands-on, student-driven inquiry where learners draw from their prior cultural knowledge and family traditions related to food, agriculture, and land stewardship. The combined concepts of these theories signify that school gardening always promotes culturally responsive teaching.

Gardening activities for preschool children foster cultural responsiveness and can bridge early learning gaps by providing a diverse range of learning opportunities. Gardening is considered the best venue for preschool children to learn because it offers hands-on learning experiences. And it's based on Jean-Jacques Rousseau (1962), who argued that a child is not an incomplete grown-up but a being with its own way of feeling, thinking, and learning. His answer was natural education: an approach where the child develops in step with nature (Kumar, 2026). Rousseau wanted education carried out, as far as possible, in harmony with the development of the child’s natural capacities through a process of self-directed discovery.

Summer gardening activities to promote culturally responsive teaching can develop the academic skills of preschool children, such as numeracy skills, science concepts, literacy skills, writing skills, fine motor skills, creativity, gross motor skills, and critical thinking. Additionally, it can foster prosocial traits such as helpfulness, sympathy for others, appreciation and respect for everyone's work, and an understanding of history. And building a strong connection among teachers, children, parents, and the community through gardening is widely considered a highly effective form of culturally responsive teaching. It bridges learning gaps by rooting abstract concepts in the lived experiences and cultural traditions of the children (Kumar, 2026).

Self-determination theory supports this. According to self-determination theory, children naturally are keen to learn, grow, and explore their surroundings. Therefore, fostering children's innate growth-oriented impulses is a key objective of education. Additionally, Froebel's engagement with nature held that children should be exposed to nature from an early age, interacting with it directly in a garden. According to Froebel, nature provides a rich, dynamic, and sensory world that is full of fascinating elements that can be explored, investigated, and learned through play, conversation, and active inquiry. He encouraged kids to dig, play adventurously, and make up

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stories. The possibilities for imaginative, creative, and symbolic play were abundant in nature and the garden. A key component of Froebel's theory was gardening. He claimed that gardening was more about helping children form a close bond with the earth, the animals who live there, and the plants that grow there than it was about teaching horticulture in a didactic manner. Froebel's idea connected freedom and responsibility, as well as the individual and the community. Froebel's gardening philosophy was not an escape from reality. He looked for any worthwhile chance to assist children in connecting with the larger human, social, and physical environments.

School gardening activities can overcome barriers and accommodate diverse children with disabilities, varying cultural backgrounds, different language proficiencies, and distinct social or emotional needs. School gardening can reflect the cultural diversity of the children body by including plants significant to different communities. School gardening activities are not only physically accessible but also culturally relevant and pedagogically flexible, providing differentiated opportunities for engagement and parental involvement by encouraging parents to participate in school gardening and promoting collaborative learning by fostering peer interactions through group activities that enhance social and cognitive skills. Cambridge University research (2021) indicates that learning in school gardens positively influences academic achievement, helps close the learning gap, contributes to greater environmental equity in urban areas, and serves as a gateway to reducing the learning gap between groups of children, particularly those defined by socioeconomic status and race. This aligns with Froebel's theory, which posits that gardening provides a space for children to develop at their pace, supported by knowledgeable and nurturing adults School gardens could serve as gateways to reducing the academic learning gaps (Children & Nature Network , 2024)

According to Bronfenbrenner's ecological systems theory (1977), an individual's growth results from interrelated environmental systems that range from social (culture) to intimate (family). According to the theory, a child's growth is a complicated web of relationships influenced by various aspects of their surroundings. This includes mesosystems, which are linkages between microsystems, like how parents and teachers discuss a child's development and provide positive guidance, and microsystems, which are the immediate surroundings and direct relationships (family, school, daycare, and classmates). This concept relates to Vygotsky's theory (1919), which states that a kid may only adopt socially shared experiences and gain practical skills and knowledge by interacting with others, especially knowledgeable individuals like adults or teachers, on various tasks. Additionally, the more knowledgeable others (MKO) might be anyone who has a deeper comprehension of the work or topic the child is attempting to acquire; these individuals are typically parents, caregivers, or teachers, but they can also be peers or mentors. In a meaningful activity, the more knowledgeable other (MKO) actively directs, models, and scaffolds the child's thinking rather than merely imparting knowledge. School gardens could serve as gateways to reducing the academic achievement gap (Children & Nature Network ,2024).

Furthermore, Vygotsky's sociocultural theory (1934) disclosed that human development and learning originate in social, historical, and cultural interactions. Vygotsky believed that a child's cognitive development and learning ability can be guided by social interactions. Vygotsky posited that social interactions can guide and mediate a child's cognitive development and learning ability. by their social interactions. Learning, in his view, is not a solitary journey—it is a shared, culturally situated activity (Cherry, K., McLeod, S., & OFFICE OF EDUCATIONAL IMPROVEMENT, 2022). Vygotsky's sociocultural theory of cognitive development proposes that children do not learn in isolation. Instead, their thinking, reasoning, and problem-solving abilities grow through engagement with other people and the cultural world around them. Vygotsky emphasizes the importance of cultural tools in shaping emotional responses during play (Celinska, 2026). Unstructured play allows children to explore and negotiate social roles and relationships, helps preschoolers learn empathy by understanding others' feelings, and promotes problem-solving and conflict resolution skills. Experiencing real emotions during unstructured play can enhance emotional regulation through shared experiences and peer feedback, while self-regulation develops from external guidance by caregivers to internalized self-control through a transformation from social interactions to individual autonomy. And this is what Vygotsky (1934) described as the Zone of Proximal Development (ZPD). According to Vygotsky's theory (1934), the ZPD is the best time for teachers to begin by offering strong guidance—through demonstrations, facilitated activities, explicit instruction, or scaffolding—and to offer practical support provided within this zone (Kumar, 2026 &Libretexts, 2025)

Thus, preschool gardening, according to Funds of Knowledge Theory (20th century), is an educational approach that shapes and directs preschool garden activities using the practical life experiences, cultural traditions, and

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home and community gardening skills that young children bring from their families. Recognizing gardening, planting, and food production as legitimate and intelligent skills, instructors value home knowledge because they see families and communities as rich sources of wisdom. Preschools make a clear connection between classroom garden projects and what kids already see, do, or hear about growing plants at home or in their community. Strength-based learning builds new science, math, and social skills on top of children's existing practical plant care knowledge rather than treating them as blank slates.

RESEARCH METHODS

Participants and/or other Sources of Data and Information

The 12 preschool children were the study's participants via purposeful random sampling. The following criteria were used to select participants: 1) The child must be officially enrolled in preschool for the SY 2025-2026. 2) The child must regularly attend classes, as evidenced by attendance reports from the teachers. 3) The parents and guardians of the preschool children must provide their full consent that their child will be the respondent in the study.

Instruments

The researcher-made observation test. It is a 3-item observation test with 12 constructs that were used. The questionnaires have been validated by three experts, and they have been pilot tested in a group of respondents not included as final participants in this study. With a grand Cranach's alpha of 0.777539988, it can be concluded that all the questionnaires are reliable. This research-made observation test passage is designed to measure the academic skills development of preschool children, such as numeracy skills, science concepts, literacy skills, writing skills, fine motor skills, creativity, gross motor skills, and critical thinking. And, to measure prosocial traits such as helpfulness, sympathy for others, appreciation and respect for everyone's work, and skills in appreciating history. Lastly, to measure in building a strong connection among teachers, children, parents, and the community through gardening is widely considered a highly effective form of culturally responsive teaching. It bridges learning gaps by rooting abstract concepts in the lived experiences and cultural traditions of the children. And the responses will be solicited using a five-point scale ranging from Very Frequently (100-80), Frequently (80-60), Occasionally (60-40), Rarely (40-20), and Never (20-0). Data were collected from pre-observation and post-observation test results to examine the importance of summer gardening activities in promoting culturally responsive teaching in order to intervene in the early learning gap for preschool children.

Data Collection

The study followed the ethical norms and a code of conduct from 1992. The study was planned and carried out in compliance with ethical standards. First, everyone involved in the study gave their full approval. The principal or school administrator and the parents or legal guardians of any children participating gave their consent, as their child was considered a respondent. The researcher was also aware of the right to privacy and the confidentiality of any information used to identify individual parents of the children whose records were included in this study, ensuring that their data was used appropriately.

Ethical Consideration

The study ensured respect by obtaining consent from the parents of the preschool respondents, protecting their privacy, maintaining adequate confidentiality of the research data, ensuring the anonymity of individuals and organizations who participated, and upholding honesty and transparency throughout the process. Additionally, the study avoided presenting any misleading data or biased representations of the primary data findings. The study upheld the right to privacy and the confidentiality of the information for the individuals involved. The researcher ensured that no harm occurred to the participants.

Data Analysis Plan

The data analysis utilized the following statistical measures: mean and standard deviation. The mean was used to define the data set in terms of the pupils' pre-test and post-test observation test results from the researcher-

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made observation test form, and the standard deviation was used to determine the difference in the observed pupils' observation test results between the pre-test and post-test results from the researcher-made observation test form. A paired t-test is used to establish the p-value and assess whether there is a statistically significant difference between two independent and dependent variables or hypothesis testing from pre-test to post-test results from a researcher-made observation test form.

Research Design

The research design used in the study was descriptive-inferential. The designs illustrate the importance of summer gardening activities to promote culturally responsive teaching in order to intervene in the early learning gap for preschool children.

RESULTS AND DISCUSSIONS

A. Tally for Discrete Variables: Respondents, Pre Test Academic Skills Test, Post Test Academic Skills Test

Pre Test						Post Test		
Academic Skills						Academic Skills		
Respondents	Count	Percent	Level	Count	Percent	Level	Count	Percent
1	1	10.00	73	2	20.00	86	2	20.00
2	1	10.00	72	4	40.00	86	3	30.00
3	1	10.00	75	2	20.00	87	2	20.00
4	1	10.00	74	2	20.00	87	2	20.00
5	1	10.00	76	2	20.00	89	2	20.00
6	1	10.00	75	2	20.00	87	2	20.00
7	1	10.00	N=	12		N=	12	
8	1	10.00						
10	1	10.00						
11	1	10.00						
12	1	10.00						
N=	12							

Descriptive Statistics: Respondents, Pre Test Academic Skill Test, Post Test Academic Skill test

Variable	N	N*	Mean	SE Mean	StDev	Minimum	Maximum
Respondents	12	0	5.700	0.766	3.028	1.000	12.000
Pre Test Prosocial Observation	12	0	72.900	0.540	1.095	73.000	75.000
Post Test Prosocial Observation	12	0	88.500	0.642	1.080	87.000	89.000

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Paired T-Test and CI: Pre Test Academic Skills Test, Post Test Academic Skills Test

Paired T for Pre Test Academic Skill Test - Post Test Academic Skills Test				
	N	**Mean**	**StDev**	**SE Mean**
Pre Test Academic Skills Test	**12**	**72.600**	**1.540**	**1.075**
Post Test Academic Skills Test	**12**	**88.500**	**1.442**	**0.342**
Difference	**12**	**-13.100**	**1.912**	**0.605**
95% CI for mean difference: (-14.569, -11.744)				
T-Test of mean difference = 0 (vs ≠ 0): T-Value = -21.69 P-Value = 0.000				

Variables **N**	**Mean**	**StDev**	**SE**	**Mean**
Pre Test Academic Skills Test results (without intervention)	**12**	**72.600**	**1.540**	**1.075**
Post Test Academic Skills Test results (with intervention)	**12**	**88.500**	**1.442**	**0.342**
Difference	**12**	**-13.200**	**1.812**	**0.605**
Note: p<0.05 (SIGNIFICANT); P<0.01 (HIGHLY SIGNIFICANT)				
95% CI for mean difference: (-14.468, -11.732)				
T-Test of mean difference = 0 (vs ≠ 0): T-Value = -21.67 P-Value = 0.001				

Test of significant difference between Pre Test Academic Skills Test and Post Test Academic Skills Test of preschool children.

The study's results show a P-value of 0.001, which means that there is a big difference between doing a summer gardening project for preschool children that promotes culturally responsive teaching and intervening in the early learning gap for preschool children. Furthermore, the study's results indicate a mean difference of -13.200 and a standard deviation of 1.812. Therefore, the results revealed a highly significant difference in the developed academic skills of preschool children, such as numeracy skills, science concepts, literacy skills, writing skills, fine motor skills, creativity, gross motor skills, and critical thinking in summer gardening activities because it promotes culturally responsive teaching and truly bridges the early learning gaps of preschool children in terms of academic skills.

It suggests that teachers should embrace the approach of emphasizing the importance of summer gardening projects because it encourages culturally sensitive teaching and fills in early learning gaps in preschoolers by providing them with a rich array of practical experience. Through summer gardening activities, it fosters the development of preschoolers' academic skills, including numeracy, science concepts, literacy, writing, fine motor skills, creativity, gross motor skills, and critical thinking. The findings of the pre-test and post-test show a substantial difference between the post-test results, which contained this method, and the pre-test results, which did not involve the intervention. Because it encourages culturally responsive teaching and helps bridge the early learning gaps of preschoolers, it is crucial for early childhood educators to create outdoor learning experiences, like gardening activities, for preschoolers (Alla, 2024). For preschoolers, outdoor learning activities like gardening benefit them, serving as a means and approach for developmentally appropriate outside exploration. There are several developmental advantages to gardening with preschool-aged children. Children also develop their language and cognitive abilities when they solve problems in groups and grasp scientific concepts (Key

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Point Academy, 2024). In fact, class gardening can always close the early learning gaps and promote holistic development in a developmentally appropriate setting.

And summer gardening activities can help preschool children develop numeracy skills by adding and subtracting the number of seeds they plant, the number of seeds required for plants to flourish, the healthy soil created by applying fertilizer, and the number of vegetables and fruits they collect. Enhance science concepts by observing that plants require healthy soil, which can be created by applying fertilizer, as well as sunlight, water, and air to thrive. Integrating science concepts with the responsibility of caring for Mother Earth is essential for young children. with taking care of Mother Earth. Young children can learn that, in order for plants to flourish, they require healthy soil, which can be created by applying fertilizer or composting leftover fruit and vegetable peels. Additionally, preschoolers can learn literacy concepts by naming the plants they grow and recognizing the first sounds of each name. Gardening is an enjoyable, practical way for young children to learn about their surroundings. It teaches them vital life skills and fosters a connection with nature. According to ASPIRE Early Education and Kindergarten (2025), gardening promotes brain development and fosters creativity, responsibility, and curiosity.

B. Tally for Discrete Variables: Respondents, Pre Test Prosocial Observation Test, Post Test Prosocial Observation Test

Pre Test		Post Test						
Pre Prosocial		Observation Test		Post Prosocial		Observation Test		
Respondents	Count	Percent	Level	Count	Percent	Level	Count	Percent
1	1	10.00	74	2	20.00	85	2	20.00
2	1	10.00	74	4	40.00	86	2	20.00
3	1	10.00	73	2	20.00	85	2	20.00
4	1	10.00	72	2	20.00	87	2	20.00
5	1	10.00	75	2	20.00	88	2	20.00
6	1	10.00	75	2	20.00	87	2	20.00
7	1	10.00	N=12			N=	12	
8	1	10.00						
10	1	10.00						
11	1	10.00						
12	1	10.00						
N= 12								

Descriptive Statistics: Respondents, Pre Test Prosocial Observation Test, Post Test Prosocial Observation test

Variable	N	N*	Mean	SE Mean	StDev	Minimum	Maximum
Respondents	12	0	5.700	0.766	3.028	1.000	12.000

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Pre Test Prosocial Observation	**12**	**0**	**72.900**	**0.540**	**1.095**	**73.000**	**75.000**
Post Test Prosocial Observation	**12**	**0**	**88.500**	**0.642**	**1.080**	**87.000**	**89.000**

Paired T-Test and CI: Pre Test Prosocial Observation Test, Post Test Prosocial Obsevation Test

Paired T for Building Strong Connection Observation Test - Post Test Building Strong Connection Observation Test				
	N	**Mean**	**St Dev**	**SE Mean**
Pre Test Building Strong Connection Observation Test	**12**	**73.800**	**1.085**	**0.640**
Post Test Building Strong Connection Obsevation Test	**12**	**87.500**	**1.090**	**0.842**
Difference	**12**	**-13.007**	**1.912**	**0.605**
95% CI for mean difference: (-14.989, -11.334)				
T-Test of mean difference = 0 (vs ≠ 0): T-Value = -21.79 P-Value = 0.003				

Variables	**N**	**Mean**	**St Dev**	**SE Mean**
Pre Test Building Strong Connection Observation Test (without intervention)	**12**	**73.800**	**1.085**	**0.640**
Post Test Building Strong Connection Observation Test (with intervention)	**12**	**87.500**	**1.090**	**0.842**
Difference	**12**	**-13.007**	**1.913**	**0.605**
Note: p<0.05 (SIGNIFICANT); P<0.01 (HIGHLY SIGNIFICANT)				
95% CI for mean difference: (-14.768, -11.832)				
T-Test of mean difference = 0 (vs ≠ 0): T-Value = -21.77 P-Value = 0.001				

Test of significant difference between Pre Test Prosocial Observation Test and Post Test Prosocial Observation Test of preschool children.

The study's results show a P-value of 0.002, which means that there is a big difference between the promotion of culturally responsive teaching during the summer gardening project and intervening in the early learning gap for preschool children. Furthermore, the study's results indicate a mean difference of -15.006 and a standard deviation of 1.912. Therefore, the results revealed a highly significant difference in the developed prosocial traits, such as helpfulness and sympathy for others, appreciating and respecting everyone's work, and history appreciation skills. Additionally, teaching preschoolers prosocial skills through gardening actively closes early learning deficits. For children who might be falling behind in traditional classroom settings, garden-based learning is very beneficial because of its hands-on, collaborative character, which naturally integrates social, emotional, and cognitive development.

It suggests that teachers should embrace the approach of emphasizing the importance of summer gardening projects because it encourages culturally sensitive teaching and fills in early learning gaps in preschoolers by providing them with a rich array of practical experience. Through summer gardening activities, it fosters the development of preschoolers' prosocial traits, such as helpfulness and sympathy for others, and appreciation and

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respect for everyone's work and history. It is essential for early childhood educators to design outdoor learning experiences, such as gardening activities, for preschoolers because they promote culturally responsive teaching and help close the early learning gaps of preschoolers (Alla, 2024). Attention span and emotional control issues are frequently the cause of early learning deficits. While children wait for seeds to develop and cope with the unexpected, gardening cultivates patience, resilience, and mindfulness. Additionally, cooperative gardening activities like sharing tools, taking turns, and working toward a shared harvest naturally encourage sharing, teamwork, and empathy. Additionally, such activities strengthen prosocial behaviors that support preschoolers' early learning (Tang, S. Y., & Wong, S. K., 2020).

Summer gardening activities can support the growth of prosocial qualities in preschoolers, such as empathy and helpfulness, as well as respect and admiration for everyone's labor and past. Because summer gardening helps preschoolers close early learning gaps by turning abstract ideas into concrete, hands-on experiences Children from diverse backgrounds have an equal chance to develop fundamental academic and life skills thanks to seamless integration of STEM, language, and social-emotional development. Additionally, the multimodal aspect of gardening addresses educational inequalities and growth in several key areas. Additionally, preschoolers' gardening experiences help close the early learning gaps (Lynch, M., & Lynch, M, 2026).

VI. C. Tally for Discrete Variables: Respondents, Pre Test Building Strong Connection Observation Test , Post Test Building Strong Connection Test

Pre Test			Post Test				
Pre Test Building Strong Connection Test			Post Test Building Strong Connection Test				
Respondents	Count	Percent	Level	Count	Percent	Level	Count	Percent
1	1	10.00	74	2	20.00	85	2	20.00
2	1	10.00	74	3	30.00	86	2	20.00
3	1	10.00	73	3	30.00	85	2	20.00
4	1	10.00	73	2	20.00	86	2	20.00
5	1	10.00	71	1	10.00	87	2	20.00
6	1	10.00	74	3	30.00	88	2	20.00
7	1	10.00	N=	12		N=	12	
8	1	10.00						
10	1	10.00						
11	1	10.00						
12	1	10.00						
N=	12							

Descriptive Statistics: Respondents, Pre Test Building Strong Connection Observation Test, Post Test Budling Strong Connection Observation test

Variable	N	N*	Mean	SE Mean	St Dev	Minimum	Maximum
Respondents	12	0	5.600	0.966	3.048	1.000	12.000

Pre Test Building Strong Connection Observation Test	**12**	**0**	**73.900**	**0.560**	**1.095**	**74.000**	**75.000**
Post Test Building Strong Connection Observation Test	**12**	**0**	**87.500**	**0.742**	**1.080**	**86.000**	**88.000**

Paired T-Test and CI: Pre Test Building Strong Connection Observation Test, Post Test Building Strong Connection Observation Test

Paired T for Building Strong Connection Observation Test - Post Test Building Strong Connection Observation Test				
	N	**Mean**	**St Dev**	**SE Mean**
Pre Test Building Strong Connection Observation Test	**12**	**73.800**	**1.085**	**0.640**
Post Test Building Strong Connection Obsevation Test	**12**	**87.500**	**1.090**	**0.842**
Difference	**12**	**-13.007**	**1.912**	**0.605**
95% CI for mean difference: (-14.989, -11.334)				
T-Test of mean difference = 0 (vs ≠ 0): T-Value = -21.79 P-Value = 0.003				

Variables	N	Mean	St Dev	SE Mean
Pre Test Building Strong Connection Observation Test (without intervention)	**12**	**73.800**	**1.085**	**0.640**
Post Test Building Strong Connection Observation Test (with intervention)	**12**	**87.500**	**1.090**	**0.842**
Difference	**12**	**-13.007**	**1.913**	**0.605**
Note: p<0.05 (SIGNIFICANT); P<0.01 (HIGHLY SIGNIFICANT)				
95% CI for mean difference: (-14.768, -11.832)				
T-Test of mean difference = 0 (vs ≠ 0): T-Value = -21.77 P-Value = 0.001				

Test of significant difference between Pre Test Building Strong Connection Observation Test and Post Test Building Strong Connection Test of preschool children.

The study's results show a P-value of 0.001, which means that there is a big difference between the promotion of culturally responsive teaching during the summer gardening project and intervening in the early learning gap for preschool children. Furthermore, the study's results indicate a mean difference of -13.007 and a standard deviation of 1.913. Therefore, the results revealed a highly significant difference in the developed connection among teachers, children, parents, and the community; gardening is widely considered a highly effective form of culturally responsive teaching. It bridges learning gaps by rooting abstract concepts in the lived experiences and cultural traditions of the children.

It suggests that teachers should embrace the approach of emphasizing the importance of summer gardening projects because it encourages culturally sensitive teaching and fills in early learning gaps in preschoolers by providing them with a rich array of practical experience. Through summer gardening activities, teachers, kids,

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parents, and the larger community are all organically brought together by preschool gardening, which acts as a potent community hub. Additionally, it inherently provides a culturally sensitive nature through common objectives of planting, caring, and harvesting, which dismantle conventional barriers and provide a cooperative environment where everyone may participate and learn. The garden serves as an outdoor classroom where teachers and students collaborate on an equal basis. It promotes experiential learning, peer collaboration, and solid interpersonal ties. Additionally, cultivate a broader sense of community. In addition to maintaining their grounds, preschool gardening may collaborate with neighborhood organizations and professional gardeners. These collaborations enable the preschool to become more integrated with the neighborhood and bring intergenerational expertise into the classroom (Abdullah, Md. A. (2026).

And preschool gardening creates a shared, hands-on environment where parents, teachers, and the community can directly support a child's holistic development, bridging the early learning gap of preschoolers through strong connections among teachers, children, parents, and other community members. Additionally, gardening opens up a channel for parental involvement. A child's first teachers are their parents. The home-school relationship: Summer gardening strengthens the home-school relationship by encouraging parents or guardians to engage in at-home gardening kits or volunteer in school gardens. Summer gardening can strengthen the home-school relationship by encouraging parents or guardians to use at-home gardening kits or volunteer in school gardens. Increased parental participation helps close early learning gaps and is directly associated with improved language, literacy, and behavioural skills. (Lynch, M. & Lynch, M., 2026).

CONCLUSIONS

The summer gardening activity promotes culturally responsive teaching as an intervention to address the early learning gap for preschoolers because it provides preschool children a rich array of practical experiences. Through summer gardening activities, teachers, kids, parents, and the larger community are all organically brought together by preschool gardening, which acts as a potent community hub. Additionally, it inherently provides a culturally sensitive nature through common objectives of planting, caring, and harvesting, which dismantle conventional barriers and provide a cooperative environment where everyone may participate and learn. Parents strengthen the home-school relationship by using at-home gardening kits or volunteering in school gardens. Increased parental participation helps close the early learning gaps of preschool children.

The summer gardening activity aims to promote culturally responsive teaching as an intervention to address the early learning gap for preschoolers; when early childhood educators create outdoor learning experiences, such as gardening activities, they can help fill these gaps and encourage culturally relevant skills. When early childhood educators create outdoor learning experiences, such as gardening activities, they can fill preschoolers' early learning gaps and encourage cultural relevance. Children benefit from the summer gardening exercise. Preschoolers' academic abilities, including numeracy, science concepts, literacy, writing, fine motor skills, creativity, gross motor skills, and critical thinking. Summer gardening activities help preschoolers develop their academic abilities, including numeracy, science concepts, literacy, writing, fine motor skills, creativity, gross motor skills, and critical thinking. through summer gardening activities.

The summer gardening activity promotes culturally responsive teaching as an intervention to address the early learning gap for preschoolers because teaching preschoolers' prosocial skills through gardening actively closes early learning deficits. Garden-based learning is very beneficial for children who might be falling behind in traditional classroom settings due to its hands-on, collaborative nature that naturally integrates social, emotional, and cognitive development. It also fosters the development of prosocial traits in preschoolers, such as helpfulness and sympathy for others, as well as appreciation and respect for everyone's work and history. Preschoolers' early learning gaps can be filled, and culturally relevant teaching is encouraged when early childhood teachers create outdoor learning experiences, such as gardening activities.

RECOMMENDATIONS

The study highlights the potential benefits of summer gardening activities for preschool children in promoting culturally responsive teaching, which can help fill or address early learning gaps. And the study recommends the following:

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1. Preschool teachers must always acknowledge the importance of the summer gardening project, as it is an effective tool for promoting culturally responsive teaching and addressing the early learning gap for preschoolers; when early childhood teachers create outdoor learning experiences, such as gardening activities, they foster a wide range of academic skill development.

2. Preschool teachers must always acknowledge the importance of the summer gardening project, as it is an effective tool for promoting culturally responsive teaching and addressing the early learning gap for preschoolers; through summer gardening activities, teachers, children, parents, and the larger community are organically brought together, creating strong connections among all participants.

3. Preschool teachers must always acknowledge the importance of the summer gardening project, as it is an effective tool for promoting culturally responsive teaching and addressing the early learning gap for preschoolers; garden-based learning is particularly beneficial for children who may be falling behind in traditional classroom settings due to its hands-on, collaborative nature, which naturally integrates social, emotional, and cognitive development. It also fosters the development of prosocial traits in preschoolers.

Practical Recommendations

Teachers can increase learning opportunities during the summer gardening project by bringing together all potential participants and soliciting their support. Collaborating and coordinating all activities will undoubtedly benefit and improve the learning of preschoolers, making these efforts a very effective implementation of culturally responsive teaching and genuinely bridging the early learning gaps in preschool. And the following practical activities are recommended.

1. Use the vegetables harvested to donate to the community food bank by connecting to the church's food donation program, and preschoolers can learn the value of helpfulness and empathy.

2. Preschoolers can learn the concept of recycling by participating in the recycling process with leftover food from the classroom, which includes composting and understanding the principles of reducing, reusing, and recycling as fertilizer for plants. Preschoolers can learn to take care of the environment.

3. Encourage more people to be involved in this GARDENING PROJECT, such as children, teachers, parents, and other people from the community. Preschool children can learn the value of cooperation and unity for creating success.

4. Preschool children will go on an educational field trip to the farms with the consent of parents and guardians. Preschoolers can learn to respect and value the works of farmers.

5. Teachers can create survey forms or pliers to solicit support, such as soil, pots, and other things. Preschoolers can learn the spirit and importance of helpfulness.

Recommendations for Practical Gardening Intervention in Promoting Culturally Responsive Teaching and Helping Bridge the Early Learning Gaps of Preschool Children and the Role of Preschool Teachers During Gardening Activities

1. Work, share, and speak with family. To find out about family gardening practices, favorite crops, or cultural plant uses, preschool instructors will visit homes or speak with parents.

2. Play that is co-constructed, or promote the essence of play. To assist children in developing a strong sense of identification and belonging, preschool teachers create garden and digging activities that mirror these real-world family behaviors.

3. Holistic growth by connecting to the background of the children: Through familiar planting activities that connect their home and school lives, preschool teachers can help children develop language, motor skills, and collaboration.

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