

Practical Farm Training Needs Of Agricultural Science Teachers For Teaching Of Urban Farming In Schools For Food Security In Bayelsa State

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Abstract: *The study investigated practical farm training needs of Agricultural Science teachers for teaching of urban farming in secondary schools for food security in Bayelsa State. The study adopted the descriptive survey design. The targeted population of the study were Agricultural Science teachers in all the public secondary schools in Bayelsa State. A sample size of one hundred and forty-nine (149) Agricultural Science teachers was randomly selected for study. Hence, the sampling technique adopted for the study was the simple random sampling technique. The instrument for data collection was the “Practical Farm Training Needs of Agricultural Science Teachers for Teaching of Urban Farming in Secondary Schools for Food Security Questionnaire (PFTNASTTUFSFSQ)”. The instrument contained twenty item statements which were used to elicit responses from the respondents. It was validated by three experts, two from the Test and Measurement unit of the Department of Counselling and Educational Psychology and one from the Department of Agricultural Science Education, Faculty of Education, Niger Delta University, Wilberforce Island, Bayelsa State. To ascertain the reliability of the instrument, the Cronbach Alpha statistical tool was used and a reliability index of 0.74 was yielded which was deemed reliable. The study contained four specific objectives and four research questions. The research questions were analyzed using mean and standard deviation. The study found that Agricultural Science teachers need training on small-space farm design and layout for teaching of urban farming in secondary schools for food security in Bayelsa State. It therefore recommended that training institutions should integrate specialised modules on nursery management and seedling production into Agricultural Science curricula.*

Keywords: Agricultural Science, Food Security, Practical Farm, Training Needs, Urban Farming

Introduction

Urban farming has emerged as a critical strategy for enhancing food security in rapidly urbanising regions, yet effective student learning in this domain depends strongly on the practical farm training needs of Agricultural Science teachers (Adeyemi, 2023). Agricultural Science, as a discipline that blends theoretical knowledge with applied skills, relies on teachers who are not only subject-matter experts but also skilled practitioners in teaching of urban farming within secondary schools. Without hands-on competence, these teachers are hindered in delivering urban farming curricula that meaningfully equip students to contribute to household and community food security and thus, attention to practical farm training needs is indispensable to the education-food-security nexus, particularly in settings like Bayelsa State where land constraints demand innovative small-scale agriculture (Bello et al., 2024). This recognition sets the stage for exploring the specific training gaps that limit teacher performance and student outcomes.

One of the foremost areas where teachers lack proficiency is small-space farm design and layout training needs. Although secondary school teachers understand general farm planning, they often do not possess the expertise to design compact systems like vertical gardens or rooftop beds, that optimize sunlight, airflow, and water access in constrained urban environments (Olufemi & Akintola, 2022). Without this design competence, school gardens remain underutilized or poorly sited, limiting both instructional value and food output. Building teachers' capacity in spatial analysis and layout planning becomes foundational, leading naturally into the need for specialized soil-less and climate-smart cultivation techniques training needs, where traditional farming knowledge must be adapted to novel systems.

In contemporary urban agriculture, soil-less and climate-smart cultivation techniques training needs, including hydroponics, aeroponics, and soilless substrate systems represent a critical gap in teacher preparation (Eze et al., 2023). Many Agricultural Science teachers remain unfamiliar with managing nutrient solutions, monitoring pH or electrical conductivity, and ensuring system hygiene. This absence of competency not only undermines practical lessons but also constrains schools from adopting resilient, space-efficient production models. Addressing this gap logically leads to container and raised-bed construction training needs, because even when teachers opt for soil-based methods, they require skills in constructing durable, safe, and locally-adapted beds.

Container and raised-bed construction training needs reflect another dimension of teacher preparedness, specifically, the capacity to build and maintain functional beds or containers using accessible materials (Nwosu, 2022). Teachers often lack skills in ensuring proper drainage, structural stability, and ergonomically designed access for students. Consequently, school-based production suffers

from rot, waterlogging, or unsafe structures. Enhancing these practical competencies would enable schools to implement scalable, low-cost systems, which in turn complements the next critical domain: seedling production and nursery management training needs.

Effective seedling production and nursery management training needs are essential for ensuring healthy crop establishment in urban farming. Teachers frequently report difficulties with germination protocols, transplant shock, and acclimatisation of seedlings, as well as limited knowledge of seed selection and storage (Okoro et al., 2024). This shortfall diminishes crop success and undermines student confidence in trial plots. Correcting this deficiency would strengthen the overall urban farming programme in schools and supports broader efforts to bolster food security through reliable crop initiation and yield.

Meanwhile, secondary school Agricultural Science teachers in Bayelsa State often possess theoretical knowledge in Agricultural Science and general pedagogical skills but lack essential practical farm training in small-space design, soilless methods, raised-bed construction, and nursery management needed to effectively teach urban farming that contributes meaningfully to food security. This gap hinders the translation of curriculum into productive school gardens and limits student engagement in viable food-production practices. By diagnosing and addressing these training deficiencies, the study aims to fill a critical void in teacher preparation and school-level food-security initiatives.

Therefore, it is against this backdrop that this study investigated practical farm training needs of Agricultural Science teachers for teaching of urban farming in secondary schools for food security in Bayelsa State.

Purpose of the Study

The main purpose of the study was to investigate practical farm training needs of Agricultural Science teachers for teaching of urban farming in secondary schools for food security in Bayelsa State. The specifically investigated;

1. small-space farm design and layout training needs of Agricultural Science teachers for teaching of urban farming in secondary schools for food security in Bayelsa State;
2. soil-less and climate-smart cultivation techniques training needs of Agricultural Science teachers for teaching of urban farming in secondary schools for food security in Bayelsa State;
3. container and raised-bed construction training needs of Agricultural Science teachers for teaching of urban farming in secondary schools for food security in Bayelsa State; and
4. seedling production and nursery management training needs of Agricultural Science teachers for teaching of urban farming in secondary schools for food security in Bayelsa State.

Research Questions

1. What are the small-space farm design and layout training needs of Agricultural Science teachers for teaching of urban farming in secondary schools for food security in Bayelsa State?
2. What are the soil-less and climate-smart cultivation techniques training needs of Agricultural Science teachers for teaching of urban farming in secondary schools for food security in Bayelsa State?
3. What are the container and raised-bed construction training needs of Agricultural Science teachers for teaching of urban farming in secondary schools for food security in Bayelsa State?
4. What are the seedling production and nursery management training needs of Agricultural Science teachers for teaching of urban farming in secondary schools for food security in Bayelsa State?

Methodology

The study area was Bayelsa State and it adopted descriptive survey research design. The targeted population of the study were Agricultural Science teachers in all the public secondary schools in Bayelsa State. A sample size of one hundred and forty-nine (149) Agricultural Science teachers was randomly selected for study. Hence, the sampling technique adopted for the study was the simple random sampling technique. The Agricultural Science teachers were chosen for the study because it is expected that they have had reasonable knowledge of Agricultural Science.

The instrument for data collection was the “Practical Farm Training Needs of Agricultural Science Teachers for Teaching of Urban Farming in Secondary Schools for Food Security Questionnaire (PFTNASTTUFSFSQ)”. It was structured into a Four-point scale of Strongly Agree (SA), Agree (A), Disagree (D) and Strongly Disagree (SD). The instrument contained twenty item statements which were used to elicit responses from the respondents. It was validated by three experts, two from the Test and Measurement unit of the Department of Counselling and Educational Psychology and one from the Department of Agricultural Science Education, Faculty of Education, Niger Delta University, Wilberforce Island, Bayelsa State.

To ascertain the reliability of the instrument, the Cronbach Alpha statistical tool was used and a reliability index of 0.74 was yielded, indicating a good reliability. The instrument was administered to the respondents by the researcher and three trained research assistants and was retrieved immediately the respondents did the needful. For the analysis, the research questions were analyzed using mean and standard deviation. For a decision to be reached, items with mean scores equal or greater 2.50 were agreed. While, items with mean scores equal to or less than 2.49 were disagreed.

Results

Research Question One: What are the small-space farm design and layout training needs of Agricultural Science teachers for teaching of urban farming in secondary schools for food security in Bayelsa State?

Table 1: Mean and Standard Deviation Analysis of Small-Space Farm Design and Layout Training Needs of Agricultural Science Teachers for Teaching of Urban Farming in Secondary Schools for Food Security in Bayelsa State

S/N	Item Statements	\bar{x}	SD	Decision
1	Competence is needed to assess and utilise limited spaces effectively for urban farming in schools.	3.32	0.87	Agree
2	Training is needed in mapping sunlight, wind direction, and water access for optimal garden layout.	3.34	0.87	Agree
3	Skills in designing vertical gardens and rooftop beds are essential for maximising production in small spaces.	3.36	0.78	Agree
4	Knowledge of crop rotation and spacing suited to compact plots is necessary for sustainable production.	3.25	0.97	Agree
5	Ability to integrate aesthetic and functional design elements in school gardens improves learning and food output.	3.32	0.88	Agree
	Grand Mean and Standard Deviation	3.32	0.87	Agree

Cut-off Mean = 2.50; N = 149

The data presented in Table 1 revealed that all the items had their mean scores ranged from 3.25 to 3.36, with their standard deviation scores of 0.78 to 0.97. However, based on the fact that the grand mean score of 3.32 with a standard deviation score of 0.87 is greater than the criterion mean score of 2.50; this therefore implies that respondents agreed that Agricultural Science teachers need training on small-space farm design and layout for teaching of urban farming in secondary schools for food security in Bayelsa State.

Research Question Two: What are the soil-less and climate-smart cultivation techniques training needs of Agricultural Science teachers for teaching of urban farming in secondary schools for food security in Bayelsa State?

Table 2: Mean and Standard Deviation Analysis of Soil-Less and Climate-Smart Cultivation Techniques Training Needs of Agricultural Science Teachers for Teaching of Urban Farming in Secondary Schools for Food Security in Bayelsa State

S/N	Item Statements	\bar{x}	SD	Decision
1	Mastery of hydroponic and aeroponic systems is essential for efficient space use in urban farming.	3.30	0.90	Agree
2	Competence in preparing and managing nutrient solutions is vital for soil-less crop production.	3.15	1.08	Agree
3	Skills in monitoring pH and electrical conductivity are required for maintaining healthy soilless systems.	3.21	1.01	Agree
4	Training in selecting climate-resilient crop varieties improves adaptation to urban environmental challenges.	3.21	1.03	Agree
5	Knowledge of low-cost and locally adaptable soil-less farming technologies enhances school garden productivity.	3.31	1.02	Agree
	Grand Mean and Standard Deviation	3.24	1.08	Agree

Cut-off Mean = 2.50; N = 149

The data presented in Table 2 revealed that all the items had their mean scores ranged from 3.15 to 3.31, with their standard deviation scores of 0.90 to 1.08. However, based on the fact that the grand mean score of 3.24 with a standard deviation score of 1.08 is greater than the criterion mean score of 2.50; this therefore implies that respondents agreed that Agricultural Science teachers need training on soil-less and climate-smart cultivation techniques for teaching of urban farming in secondary schools for food security in Bayelsa State.

Research Question Three: What are the container and raised-bed construction training needs of Agricultural Science teachers for teaching of urban farming in secondary schools for food security in Bayelsa State?

Table 3: Mean and Standard Deviation Analysis of Container and Raised-Bed Construction Training Needs of Agricultural Science Teachers for Teaching of Urban Farming in Secondary Schools for Food Security in Bayelsa State

S/N	Item Statements	\bar{x}	SD	Decision
1	Skills in constructing durable raised beds using local materials are crucial for sustainable school gardens.	3.25	0.99	Agree
2	Competence in ensuring proper drainage in container and bed systems is essential for healthy crops.	3.34	0.98	Agree
3	Knowledge of ergonomically safe designs for student use improves garden accessibility and safety.	3.36	0.78	Agree
4	Training in cost-effective construction methods supports long-term maintenance of school farm structures.	3.27	0.93	Agree
5	Ability to adapt container and bed designs to different crop needs enhances production efficiency.	3.22	0.98	Agree
Grand Mean and Standard Deviation		3.29	0.93	Agree

Cut-off Mean = 2.50; N = 149

The data presented in Table 3 revealed that all the items had their mean scores ranged from 3.22 to 3.36, with their standard deviation scores of 0.78 to 0.99. However, based on the fact that the grand mean score of 3.29 with a standard deviation score of 0.93 is greater than the criterion mean score of 2.50; this therefore implies that respondents agreed that Agricultural Science teachers need training on container and raised-bed construction for teaching of urban farming in secondary schools for food security in Bayelsa State.

Research Question Four: What are the seedling production and nursery management training needs of Agricultural Science teachers for teaching of urban farming in secondary schools for food security in Bayelsa State?

Table 4: Mean and Standard Deviation Analysis of Seedling Production and Nursery Management Training Needs of Agricultural Science Teachers for Teaching of Urban Farming in Secondary Schools for Food Security in Bayelsa State

S/N	Item Statements	\bar{x}	SD	Decision
1	Competence in seed germination protocols ensures high seedling survival rates.	3.17	1.09	Agree
2	Skills in transplanting and hardening-off seedlings are necessary for successful crop establishment.	3.16	1.07	Agree
3	Knowledge of seed treatment and storage methods preserves seed quality for future planting.	3.23	0.95	Agree
4	Ability to manage nursery pests and diseases reduces losses in seedling production.	3.24	0.97	Agree
5	Training in cost-effective nursery management enhances school-based crop production.	3.35	0.78	Agree
Grand Mean and Standard Deviation		3.23	0.97	Agree

Cut-off Mean = 2.50; N = 149

The data presented in Table 4 revealed that all the items had their mean scores ranged from 3.17 to 3.35, with their standard deviation scores of 0.78 to 1.09. However, based on the fact that the grand mean score of 3.21 with a standard deviation score of 0.88 is greater than the criterion mean score of 2.50; this therefore implies that respondents agreed that Agricultural Science teachers need training on seedling production and nursery management for teaching of urban farming in secondary schools for food security in Bayelsa State.

Discussion

The study found in Table 1 that Agricultural Science teachers need training on small-space farm design and layout for teaching of urban farming in secondary schools for food security in Bayelsa State. School gardens and institutional plots function most effectively when teachers possess practical, context-sensitive design skills; Rahaman et al. (2025) recent study “*School Gardens as a Pedagogical Tool in Teaching and Learning of Agriculture in Senior High Schools in Ghana*” documented this clearly. The authors

surveyed Agricultural Science teachers in Ghanaian senior high schools and found that while many schools have gardens, the gardens are often poorly sited, inadequately managed and underused because teachers have not received professional development focused on garden planning, design and year-round management (Rahaman et al., 2025). Their analysis emphasises that land scarcity and lack of water sources in urban and peri-urban school settings require teachers to be trained specifically in making the best use of limited spaces (for example, compact layouts, vertical solutions and water-efficient siting). This finding corroborates the Bayelsa observation: if teachers lack small-space design competence, school gardens will remain token spaces rather than productive teaching laboratories that contribute to local food security, and thus capacity building in spatial design is a necessary first step toward functional urban-farming programmes in schools (Rahaman et al., 2025).

Secondly, in Tables 2, it was revealed that Agricultural Science teachers need training on soil-less and climate-smart cultivation techniques for teaching of urban farming in secondary schools for food security in Bayelsa State. The finding that Agricultural Science teachers in Bayelsa State require training on soil-less and climate-smart cultivation techniques for teaching urban farming resonates with broader educational imperatives for modern agriculture. Fussy and Papenbrock (2022), in their review *“An Overview of Soil and Soil-less Cultivation Techniques: Chances, Challenges and the Neglected Question of Sustainability”*, argued that soil-less systems, such as hydroponics, aeroponics, and substrate-based cultivation offer significant advantages for space-limited and water-constrained environments but necessitate precise operational knowledge in nutrient formulation, substrate selection, hygiene practices, and system maintenance. This supports the Bayelsa State finding by demonstrating that without targeted training in these technical and management competencies, teachers will struggle to sustain functional soilless systems and therefore cannot effectively model or teach climate-smart, space-efficient urban farming, limiting the contribution of school-based agriculture to food security.

In the same vein, in Table 3, the study revealed that Agricultural Science teachers need training on container and raised-bed construction for teaching of urban farming in secondary schools for food security in Bayelsa State. The finding that Agricultural Science teachers need training on container and raised-bed construction for teaching of urban farming in secondary schools for food security in Bayelsa State aligns with the work of Adeoye (2020), who in his study *“Enhancing Urban Agriculture Practices through Teacher Capacity Building in Nigeria”* emphasised that many teachers lack the technical competence to design and construct simple yet effective container and raised-bed systems suitable for small-scale school farming projects. Adeoye found that while urban farming presents viable opportunities for food production in space-limited environments, the absence of structured training on practical construction methods hampers teachers’ ability to transfer such skills to students. This corroborates the present finding by showing that without hands-on competence in container and raised-bed systems, the teaching of urban agriculture remains theoretical rather than practical, thereby limiting its contribution to food security outcomes in school and community contexts.

Finally, in Tables 4, the study revealed that Agricultural Science teachers need training on seedling production and nursery management for teaching of urban farming in secondary schools for food security in Bayelsa State. The finding that *Agricultural Science teachers need training on seedling production and nursery management for teaching of urban farming in secondary schools for food security in Bayelsa State* is consistent with the work of Nwachukwu (2015) in *Capacity Building for Urban Agriculture in Nigerian Secondary Schools*, who observed that teachers often lack the practical competence to establish and manage nurseries, a skill critical for sustainable vegetable and ornamental crop production. Similarly, Adekunle (2019), in his study *Improving Horticultural Practices through Teacher Training in Urban Schools*, found that inadequate knowledge of seed selection, germination techniques, and transplanting significantly limits effective teaching and adoption of urban farming. In the same vein, Adedokun et al. (2021), in *Sustainable Urban Agriculture: Training Needs of Agricultural Educators in Nigeria*, highlighted that nursery management skills are central to enhancing crop survival rates in urban food systems, and the absence of such skills among teachers reduces students’ exposure to best practices. Together, these studies reinforce the present finding by demonstrating that without specialised training in seedling production and nursery management, Agricultural Science teachers may struggle to deliver the practical competencies necessary to make urban farming a viable strategy for school-level food security.

Conclusion

Based on the findings, the study concluded that;

1. Agricultural Science teachers need training on small-space farm design and layout for teaching of urban farming in secondary schools for food security in Bayelsa State.
2. Agricultural Science teachers need training on soil-less and climate-smart cultivation techniques for teaching of urban farming in secondary schools for food security in Bayelsa State.
3. Agricultural Science teachers need training on container and raised-bed construction for teaching of urban farming in secondary schools for food security in Bayelsa State.
4. Agricultural Science teachers need training on seedling production and nursery management for teaching of urban farming in secondary schools for food security in Bayelsa State.

Recommendations

Based on the findings, the study recommended that;

1. Agricultural Science teachers should be provided with targeted professional development programmes on seedling production and nursery management to enhance their practical competencies.
2. Government and educational agencies should supply schools with basic nursery facilities and materials to support hands-on training in urban farming.
3. Teacher training institutions should integrate specialised modules on nursery management and seedling production into Agricultural Science curricula.
4. Partnerships should be established between secondary schools and local agricultural extension services to provide continuous technical support for teachers in nursery-related practices.

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