

Fish Farming Training Needs for Agricultural Science Teachers in Secondary Schools in Bayelsa State, Nigeria

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Abstract

The study investigated the fish farming training needs for Agricultural Science teachers in public secondary schools in Bayelsa State, Nigeria. Two purposes of the study, research questions and two null hypotheses guided the study. The study adopted a descriptive survey design. The population of the study is 286 teachers (157 males and 129 females) from 207 schools in nine educational zones. Data were collected using a validated 31-item structured questionnaire rated on a four-point Likert scale. The reliability of the instrument was determined using Cronbach Alpha. Data analysis employed mean, standard deviation, and z-test at 0.05 level of significance. The results showed that both male and female teachers expressed a high need for training in the two components. Furthermore, z-test results indicated no significant differences in the training needs. The study recommended that the ministry of education with relevant stakeholders should organize regular, hands-on training and capacity-building workshops to equip Agricultural Science teachers with practical skills in fish farming for more effective classroom delivery.

Keywords: Fish Farming, Training Needs, Agricultural Science Teachers

Introduction

Fish is widely acknowledged as an essential and economical source of animal protein. It addresses both nutritional and financial needs, particularly for resource-constrained populations (Ibemere&Ezeano, 2015). It's an alternative to increasingly expensive meat sources and dwindling capture fish supplies. Fish farming is becoming a more viable and attractive livelihood option. Swift (2007) describes fish farming as the cultivation of fish within controlled environments such as artificial ponds or tanks. This practice, which has been sustained over decades, offers an accessible and sustainable solution to the growing demand for protein, especially in developing nations like Nigeria (Abda &Eglal, 2010; FMARD, 2018). Fish farming is not only a crucial means of food production but also a strategy for promoting rural development, youth engagement, and income generation. It requires a wide array of managerial skills such as site selection, pond construction, feeding, water quality control, and cropping. These are critical for success and can be effectively transferred through structured training

programmes. Proper site selection, for instance, involves consideration of soil fertility, water availability, and accessibility, all of which influence farm productivity (Ezema, 2008). Additionally, fish breeding, feed formulation, and harvesting techniques should be implemented using best management practices to enhance yield and sustainability (Aihonsu & Shittu, 2011).

Moreover, the increasing incorporation of fish farming into the secondary school agricultural curriculum in Nigeria underscores its potential to equip students with marketable skills and foster self-employment opportunities. Through the agricultural science programme, students are introduced to the fundamentals of fishery, including practical exposure to breeding, pond management, and marketing (National Policy on Education, 2013). These hands-on experiences serve as a foundation for building competencies that are essential for engaging in agribusiness. Training, as defined by Asogwa, et al (2016), is a process of skill acquisition aimed at improving technical proficiency and business outcomes. For secondary school students, particularly those in agricultural science programmes, targeted training in fish farming enhances their ability to apply theoretical knowledge to practical situations. This increases the potential for employment or entrepreneurship in the aquaculture sector. Consequently, equipping students with the necessary managerial skills training has far-reaching implications for food security, youth empowerment, and national economic development.

Statement of the Problem

Despite increasing focus on fish farming as a viable component of agricultural education in Nigeria, a significant gap remains in the acquisition and practical application of managerial skills required for successful fish production among secondary school students. Although fish farming is included in the senior secondary school agricultural curriculum, many students lack adequate exposure to the technical and business-oriented aspects of the enterprise, including effective site selection, feed formulation, water quality management, and harvesting procedures. This gap limits their readiness for post-school self-employment in fish farming and undermines the broader objective of fostering entrepreneurship through education.

Furthermore, the impact of structured training interventions on students' competence in fish farming remains inadequately explored. There is limited evidence to show whether current school-based training programmes translate into measurable skills that students can apply to initiate and sustain fish farming enterprises. The challenge is compounded by inadequate instructional materials, limited practical sessions, and insufficiently trained teachers. As a result, many students struggle to gain meaningful proficiency in aquaculture management. Given the growing demand for food security solutions and job creation strategies among the youth, it is imperative to investigate how targeted training in fish farming can strengthen students' managerial capabilities and foster entrepreneurial intentions. Without such an assessment, the potential of agricultural education to drive rural development and reduce youth unemployment may remain underutilized.

Purpose of the Study

The major purpose of the study was to examine the fish farming training needs of agricultural science teachers in secondary schools in Bayelsa State. Specifically, it examines:

1. The extent to which site selection as a fish farming training is needed for agricultural science teachers in secondary schools in Bayelsa State.
2. The extent to which pond construction as a fish farming training is needed for agricultural science teachers in secondary schools in Bayelsa State.

Research Questions

1. To what extent is site selection a fish farming training needed for agricultural science teachers in secondary schools in Bayelsa State?
2. To what extent is pond construction a fish farming training needed for agricultural science teachers in secondary schools in Bayelsa State?

Hypotheses

The preceding null hypothesis are developed and tested at a significance level of 0.05:

1. There is no significant difference between the mean ratings of the responses of male and female teachers on site selection as a fish farming training need for agricultural science teachers in secondary schools in Bayelsa State
2. There is no significant difference between the mean ratings of the responses of male and female teachers in pond construction as a fish farming training need for agricultural science teachers in secondary schools in Bayelsa State.

Methodology

A descriptive survey research design was adopted for this study. This design was considered appropriate because it involves obtaining data as observed in the field by the researcher and as reported by the respondents, without manipulation. According to Nworgu (2015), a descriptive survey design entails examining a segment of a population in order to record, represent, and explain the existing or non-existing status of observable facts under investigation. It is an important tool for evaluating opinions and trends from a representative sample of the population. In addition, the design helps the researcher collect data on people's attitudes, opinions, and behaviours as they appear in the study. The population consisted of 286 Agricultural Science teachers drawn from 207 public junior and senior secondary schools across nine educational zones in Bayelsa State, Nigeria. Of this number, 157 were male and 129 were female. The schools were spread across eight Local Government Areas. The educational zones covered in the study included Sagbama, Silga I, Ekeremor, Brass, Kolga, Nembe, Silga II, Yenagoa, and Ogbia.

The study employed a census approach by involving all 286 Agricultural Science teachers across public secondary schools in Bayelsa State, as the population size was considered sufficiently manageable for complete coverage. A researcher-developed structured questionnaire consisting of 31 items was used for data collection. The items were measured on a four-point Likert-type scale: Highly Needed (HN), Needed (N), Slightly Needed (SN), and Not Needed (NN). The instrument was divided into two main parts. Part A gathered demographic information, while Part B focused on the core study variables. Part B was further divided into two sections. Section A assessed the extent to which Agricultural Science teachers required training in site selection, and Section B explored their training needs in pond construction. To ensure content validity, the draft questionnaire was reviewed by the research supervisor and two experts from the Department of Educational Foundations at Niger Delta University. They evaluated the clarity

and relevance of each item and suggested improvements. The feedback provided was incorporated into the final version of the instrument.

The reliability of the instrument was determined through a pilot test conducted with 25 Agricultural Science teachers from Delta South who were not part of the main study. The questionnaire was administered once, and the responses were analysed using the Cronbach Alpha method. Reliability coefficients of 0.711 for site selection and 0.718 for pond construction were obtained, showing acceptable internal consistency and dependability. The questionnaire was distributed with the assistance of six trained research assistants. They administered it to both junior and senior secondary school teachers across the nine educational zones of Bayelsa State. The assistants were instructed on how to guide respondents when necessary. Each respondent was given one week to complete the questionnaire. Out of 286 distributed, 226 were retrieved and deemed suitable for analysis.

Descriptive and inferential statistics were employed in the data analysis. Mean and standard deviation were used to answer the research questions. A benchmark mean of 2.50 determined whether an item was classified as “needed” (≥ 2.50) or “not needed” (< 2.50). The standard deviation indicated the level of consistency in responses. For hypothesis testing, the z-test was applied at the 0.05 level of significance. A null hypothesis was accepted if the calculated z-value was less than the critical value at 284 degrees of freedom. If the z-calculated value exceeded the z-critical value, the null hypothesis was rejected.

Results

Research Question 1: To what extent is site selection a fish farming training needed for agricultural science teachers in secondary schools in Bayelsa State?

Table 1: Mean rating of responses of male vs female teachers on the extent site selection is a fish farming training needed for agricultural science teachers in secondary schools

Environmental Factors	Male Mean (SD)	Decision	Female Mean (SD)	Decision
Understanding the topographical features of the land	3.23 (0.95)	Needed	3.43 (1.10)	Needed
Preference for gently sloping terrain with clayey soil	2.96 (0.92)	Needed	3.12 (0.99)	Needed
Suitable soil texture ranging from clay loam to sandy clay loam	3.10 (0.95)	Needed	3.52 (0.97)	Needed
Selection of a location that is not prone to flooding	3.11 (0.96)	Needed	3.57 (0.76)	Needed
Accessibility to roads to facilitate efficient transportation	3.10 (0.99)	Needed	3.61 (0.85)	Needed
Availability of sufficient land area for current operations and potential future growth	3.50 (0.10)	Needed	3.26 (0.84)	Needed

Environmental conditions that support optimal fish growth and development	3.42 (0.77)	Needed	3.72 (0.74)	Needed
Awareness of the soil's chemical properties and their impact on aquaculture	2.99 (0.61)	Needed	3.71 (1.30)	Needed
Situated in an environment free from pollution	3.00 (1.19)	Needed	3.31 (0.71)	Needed
Biological Factors				
Choose the species to be cultivated	3.57 (0.95)	Needed	3.51 (0.87)	Needed
Ensure the availability of healthy fingerlings	3.43 (0.75)	Needed	3.59 (0.55)	Needed
Determine the appropriate culture system to be used	3.18 (0.87)	Needed	3.38 (0.62)	Needed
Socio-Economic Factors				
Develop a layout plan for the intended site	3.15 (0.98)	Needed	3.24 (0.96)	Needed
Consideration of land ownership and regulatory requirements	3.48 (0.69)	Needed	3.09 (0.95)	Needed
Selection of modern technologies that are both economically viable and technically feasible	3.23 (0.99)	Needed	3.35 (0.81)	Needed
Identification of essential services and resources for farm operations	2.97 (0.91)	Needed	3.27 (1.50)	Needed
Securing adequate financial resources	3.43 (0.80)	Needed	3.50 (0.70)	Needed
Assessment of market demand for the farm's products	3.25 (0.69)	Needed	3.38 (0.59)	Needed
Grand Mean and SD	3.20 (1.19)		3.22 (1.22)	

The data presented in Table 1 show the mean responses on site selection as a fish farming training needed for Agricultural Science teachers in secondary schools across Bayelsa State. For male respondents, mean scores across all eighteen items ranged from 2.96 to 3.57. Female respondents recorded mean scores ranging from 3.09 to 3.71. All these values exceeded the benchmark mean of 2.50, indicating agreement among both male and female teachers that the listed items represent important training needs in site selection.

In addition, the grand mean scores were 3.20 for male teachers and 3.22 for female teachers. Both scores are well above the criterion mean of 2.50. This finding reinforces that training in site selection is regarded as essential for Agricultural Science teachers in secondary schools within Bayelsa State.

Research Question 2

To what extent is pond construction a fish farming training needed for agricultural science teachers in secondary schools in Bayelsa State?

Table 2: Mean rating of responses of male vs female teachers on the extent pond construction is a fish farming training needed for agricultural science teachers in secondary schools

Earthen Pond	Male Mean	Decision	Female Mean (SD)	Decision
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	(SD)			
Preparing the site by clearing and leveling the land for pond construction	3.50 (0.76)	Needed	3.65 (0.62)	Needed
Establishing a reinforced clay core to ensure structural stability	3.39 (0.82)	Needed	3.39 (0.71)	Needed
Digging and shaping the pond, followed by the construction of surrounding embankments	3.22 (0.98)	Needed	3.32 (0.82)	Needed
Installing suitable systems for regulating water inflow and outflow	3.62 (0.67)	Needed	3.26 (0.99)	Needed
Implementing protective measures to preserve the integrity of the pond	3.29 (0.92)	Needed	3.60 (0.68)	Needed
Constructing a secure fence around the pond to prevent external interference	3.27 (0.83)	Needed	3.20 (0.94)	Needed
Filling the pond with water, readying it for stocking	3.22 (0.92)	Needed	3.73 (0.82)	Needed
Gaining a clear understanding of the requirements for the pond's foundation, depth, and elevation	2.99 (.61)	Needed	3.71 (1.03)	Needed
Applying waterproofing techniques using resilient materials such as reinforced nylon liners	3.33 (0.83)	Needed	3.10 (0.89)	Needed
Ensuring the embankments meet the correct height specifications	3.15 (0.89)	Needed	3.65 (0.76)	Needed
Preparing and applying a concrete mixture for key structural elements	3.27 (0.82)	Needed	3.26 (0.85)	Needed
Using appropriate plastering techniques to strengthen the walls and floor of the pond	3.36 (0.73)	Needed	3.64 (0.75)	Needed
Designing and building durable systems for controlling water flow into and out of the pond	3.14 (0.98)	Needed	3.64 (0.69)	Needed

Preparing the site by clearing and leveling the land for pond construction	3.08 (0.83)	Needed	3.42 (0.78)	Needed
Grand Mean and SD	3.25 (1.22)		3.19 (0.92)	

Table 2 presents the mean responses on pond construction as a fish farming training need for Agricultural Science teachers in secondary schools in Bayelsa State. For male respondents, mean scores across the twelve items ranged from 3.08 to 3.62. Female respondents recorded mean scores ranging from 3.10 to 3.73 across the same items. All these values surpassed the threshold of 2.50. This indicates that both male and female teachers recognised the identified items as necessary training needs in pond construction.

The grand mean scores were 3.25 for male teachers and 3.19 for female teachers, as shown in Table 2. Since both values are well above the benchmark mean of 2.50, the findings confirm that pond construction is regarded as a crucial fish farming training need among Agricultural Science teachers in secondary schools within Bayelsa State.

Hypothesis 1: There is no significant difference between the mean ratings of the responses of male and female teachers in site selection as a fish farming training need for agricultural science teachers in secondary schools in Bayelsa State

Table 3: Z-test difference between the mean ratings of the responses of male vs female teachers in site selection as a fish farming training need for agricultural science teachers in secondary schools

Variable	N	X	SD	df	z-cal	z-tab	s/level	Decision
Male Teachers	157	3.20	1.19	284	0.695	1.960	0.05	Accept
Female Teachers	129	3.22	1.22					Ho

The z-test analysis presented in Table 3 shows that the calculated z-value of 0.695 is lower than the critical z-value of 1.960 at a 0.05 significance level and 284 degrees of freedom. This indicates that there is no significant difference between the mean responses of male and female teachers regarding site selection as a training need for fish farming in Agricultural Science in secondary schools across Bayelsa State. Consequently, the null hypothesis, which posits no significant difference, is accepted.

Hypothesis 2: There is no significant difference between the mean ratings of the responses of male and female teachers in pond construction as a fish farming training need for agricultural science teachers in secondary schools in Bayelsa State.

Table 4: Z-test difference between the mean ratings of the responses of male vs female teachers on pond construction as a fish farming training need for agricultural science teachers in secondary schools

Variable	N	X	SD	df	z-cal	z-tab	s/level	Decision
Male Teachers	157	3.25	1.22	284	1.234	1.960	0.05	Accept Ho
Female Teachers	129	3.19	0.92					

The z-test analysis presented in Table 4 shows that the calculated z-value of 1.234 is smaller than the critical z-value of 1.960 at a 0.05 significance level and 284 degrees of freedom. This suggests that there is no significant difference between the mean responses of male and female teachers regarding pond construction as a training need for fish farming in Agricultural Science in secondary schools in Bayelsa State. Therefore, the null hypothesis, which states there is no significant difference, is accepted.

Discussion of Findings

Research question 1 examined the extent to which site selection is a fish farming training need for male and female Agricultural Science teachers in secondary schools in Bayelsa State. The data in Table 1 show mean scores of 3.20 for male teachers and 3.22 for female teachers. Both values exceed the cutoff mean of 2.50. This demonstrates that Agricultural Science teachers recognize site selection as a necessary training component.

Hypothesis 1 produced a p-value of 0.695, which is greater than the 0.05 significance level. This means there was no significant difference between the responses of male and female teachers regarding the need for training in site selection. Therefore, the null hypothesis was accepted. These findings agree with Igbokwe, Asadu, and Bawa (2010), who state that establishing a standard fishpond begins with proper site selection. The choice of site depends on factors such as soil quality, water availability, proximity to markets, and access to productive fingerlings and feed. The authors also highlight essential practices such as feeding fish at the right time and volume, maintaining water quality, controlling weeds, and applying fertilizers, lime, and pest control measures.

However, many Agricultural Science teachers lack the technical skills required for fishpond construction and operation. This is largely due to inadequate pre-service training in practical fisheries education. As a result, teachers need to update their practical knowledge of fishpond design and management in order to effectively teach fish farming in schools.

Research question 2 examined the extent to which pond construction is regarded as a fish farming training need by Agricultural Science teachers in secondary schools in Bayelsa State. The data in Table 2 show that both male and female teachers reported mean responses above the 2.50 criterion. This indicates a clear need for training in pond construction.

Hypothesis 2 produced a p-value of 1.234, which is greater than the 0.05 significance level. This shows that there is no significant difference between male and female teachers' opinion on the need for training in pond construction. Therefore, the null hypothesis was accepted.

These findings are consistent with Chackroff (2002), who argues that fish ponds regardless of size or cost share fundamental construction techniques, whether in small backyard settings or large hatchery systems. The results also support Ita (2011), who emphasizes the role of site selection in pond construction. Similarly, Dumbiri (2011) highlights that the inclusion of trade and entrepreneurship in the secondary school curriculum was driven by the need for technical skills in Nigeria's economy. To effectively teach fish farming in secondary schools, Agricultural Science teachers must possess both theoretical knowledge and practical expertise. They also need the ability to utilize appropriate teaching resources. Asogwa (2016) adds that teachers must have a background in the fishing industry and continually update their knowledge to remain effective.

Conclusion

The results of the study highlight the need for training in both site selection and pond construction for Agricultural Science teachers in secondary schools within Bayelsa State. The findings revealed that male and female teachers shared a clear consensus on the importance of these training areas. Their mean scores all exceeded the threshold of 2.50, showing strong agreement on the need for professional development in these aspects of fish farming.

Statistical analysis further confirmed that there were no significant differences between male and female teachers' responses. The emphasis on site selection training aligns with the view that successful fishpond establishment depends on key factors such as soil composition, water availability, market proximity, and access to inputs. Similarly, the importance of pond construction training was validated by both the quantitative results and findings from previous research in the field.

Recommendations

Drawing from the results of this study it is proposed that:

1. The Ministry of Education in Bayelsa State, in collaboration with agricultural education stakeholders, should organise regular in-service training and capacity-building workshops for Agricultural Science teachers. They should also prioritize equipping teachers with hands-on, practical skills needed to effectively teach fish farming in secondary schools.
2. Government and school authorities should provide adequate facilities, instructional materials, and teaching aids for the practical teaching of fish farming.
3. Teachers and students should also have access to demonstration fishponds and field-based instructional tools. These resources would significantly enhance experiential learning in fish farming.
4. Secondary schools should forge partnerships with aquaculture experts, institutions, and relevant non-governmental organisations (NGOs) to offer periodic training, mentorship, and technical support to Agricultural Science teachers.
5. The implementation of fish farming training should be accompanied by a monitoring and evaluation framework to assess the effectiveness of the training programmes and identify areas for further improvement.

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