

Pond Water Management Modules and Students' Acquisition of Skills in Fish Culture in Secondary Schools in Uyo Local Government Area of Akwa Ibom State

Archibong, Catherine Alfred
Department of Agricultural Education
College of Education, Afaha Nsit

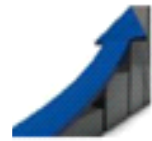
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Etim, Grace Johnson
Department of Agricultural Education
College of Education, Afaha Nsit

Abstract

The study was conducted to determine the pond water management modules and students' acquisition of skills in fish culture in secondary schools in Uyo Local Government Area of Akwa Ibom. Two objectives, two research questions and two null hypotheses were poised to guide the study. Quasi experimental, Pre-test, post-test non-randomized control group design was adopted for the study, with the population of 6,058 SS11 students offering agricultural science in secondary schools in the four clans in Uyo Local Government Area. The schools were sampled based on availability of fish pond culture facilities or closeness to location of fish pond and qualified agricultural science teachers to handle the subject. Four secondary schools were sampled using balloting technique and a total of 200 students were used for experimentation and the control. Pond water management instructional package (PWMIP) and pond water management skills acquisition test (PWMSAT) divided into two sections A-B was developed and used to generate data for the study. The instrument was validated by three experts from the Department of Agricultural Education, Faculty of Education, University of Uyo. Test- retest method was utilized and treated to Cronbach Alpha statistics which yielded a reliability coefficient of .94. Mean, standard deviation and analysis of covariance were used to analyze data obtained. The hypotheses were tested at 0.05 level of probability. The results revealed that there is a significant difference in the students' skills acquisition level with pond water fertilization and pond water temperature control between students taught with the used of instructional module and those taught with conventional strategies. Based on the findings, it is recommended that state government and state secondary school board should provide adequate fish pond facilities to public secondary schools to enhance students' skills acquisition development in fish culture in Uyo Local Government Area, of Akwa Ibom State.

Keywords: Acquisition, Fish Culture, Management, Pond Water, Skills.



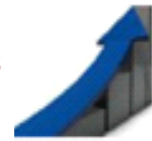
Introduction

A pond is a body of standing water, which may be natural or man-made. Naturally, it may arise from flood plains as part of a river system or from an isolated depression (FAO, 2000). Pond contains shallow water with marsh aquatic plants and animals. Some ponds are created for habitat restoration, aesthetics, and ornamentation as landscape or architectural features (FAO, 2007). One of the most important features of ponds is the presence of standing water which provide habitat for wetland plants and animals. Such plant and animals include water lilies, frog, turtles and herons (Hughes, 2003). Pond according to Keddy, (2010), can result from the wide range of natural processes, such as depression in the ground which collects and retains sufficient amount of precipitation. Such depression can be formed by a variety of geological and ecological processes. A fish pond is an artificial structure used for the farming of fish. It is filled with fresh water, is fairly shallow and usually non-flowing. A fish pond is a controlled pond, artificial lake or reservoir that is stocked with fish and is used in aquaculture for fish farming or is used for recreational fishing or for ornamental purposes.

The fish pond in this work explains the artificially constructed structures using concrete with the following dimension of 3m x 5m x 1.5m. Fish ponds are of different types, kinds and sizes and have to be managed for derivation of benefits. Fish could be reared naturally in the pond water; the fish pond source of water is directed into the pond for purposes of culturing fish. Fish pond can be done using plastic containers, earthen pond, drums, and all forms of containers depending on the size and purpose of rearing the fish. Fish pond culture refers to the farming and husbandry of fish under control or semi-controlled condition (Iwena, 2008). The establishment and management of fish pond is a component of the secondary schools curriculum but, it is rather observed that, the majority of secondary schools in Uyo Local Government area are yet to teach fish pond management and a few also establish and manage fish ponds. It is doubtful if the students who are supposed to be beneficiaries are exposed to practical experiences not to talk of acquisition of skills for managing pond water in fish pond culture at satisfactory levels

A module represents a training package arranged in units of related skills for transferring skills to the trainees in a specified area (Onuka, 2008). According to Yabani (2006) a module is a unit of related skills arranged sequentially to be used in teaching a group of learners within a given time. The objectives contents and methodology are represented at a glance in a concise form for the trainer and trainees to ensure that they are participating effectively in the training programme. It is expected that the correct use of modules for pond water management are bound to make training effective. Olaitan and Ekong (2002) identified three stages in developing a module, which include:

1. Going to the field to source information about a particular occupation with respect to the skills of operation and other relevant information required for the performance of task in the occupation.



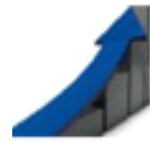
2. Writing the step-by-step procedure for carrying out the skills activities, and
3. Validating the information using experts in the occupational field.

Module is therefore defined in this study as a series of arranged packages of operations or training stages that specify the procedures of management of pond water for fish culture in various ways (fertilization, temperature control). Pond water management is meant to ensure the physical, chemical and biological suitability of pond water for controlling of growing fish. Okaeme (2010) described pond water management as an act of keeping fish in captivity and feeding them to grow to manure size for sale, consumption or for some other purposes. Some of the selected pond water management practices include pond water fertilization and pond water temperature control etc.

Pond fertilization is the application of organic or inorganic fertilizer to the pond; the fertilization in fish farming is to improve water quality and to increase the variety and quality of phytoplankton and Zooplankton, which eventually leads to high fish yield and economic returns. The ultimate goals of fertilization is to achieve suitable environmental conditions for the fish production of natural food for fish, fertilizers increase the level of primary productivity, algae abundance, dissolved oxygen, P^H and total phosphates (Afzal, Rub, Akhtar, Kham, Barlas and Qayyum, 2007).

Temperature is linked with dissolved oxygen it is inversely proportional to dissolved oxygen level. Each fish species is adapted to a range of temperature. These are minimum and maximum temperatures that can sustain live fish. Temperature affects physical, chemical and biological processes in water bodies which alter the concentration of dissolved oxygen and the rate of photosynthesis, under stress from increased temperature, shallow water ecosystems can undergo a state of change, characterized by the rapid loss of macrophytes and subsequent dominance of phytoplankton (Mckee, Collions, Eaton, Gill, Harvey, Hatton, Heyes, Wilson & Moss 2003). The relevance of pond water temperature for the fish are: Slowing down the development of their eggs, reducing the growth of juveniles and older fish, decreasing their food intake and even stopping it completely and increasing their susceptibility to infections and diseases.

In some secondary schools in Uyo Local Government Area, though, fisheries is there in their curriculum to be thought as a topic in agricultural science, it is only the theoretical part of it the students are learning, the schools could not establish fish ponds. This is as a result of not having a well equipped genetic laboratories where research can be carried out on the production of genetically improved species of fishes, poor management skills, inadequate supply of quality seeds, lack of capital, high cost of feeds, faulty data collation, lack of environment impart consideration and marketing of products and poor security. Fish culture is benefiting activities as it extend into several direct and indirect benefits; fish culture provides a new commercial avenue, opens job opportunities to the masses, generates foreign exchange, useful in the area of research work and other educational purposes and also provides easy digestible protein-rich food, which helps in improving nutritional status of the masses.



Statement of the Problem

Fish is an important source of protein and the consumption rate is very high. Every home virtually uses fish as an important condiment in food preparation. Despite this importance, the production rate is very low at least to complement other sources of protein. For increase production, fish culture has to be taught in schools since it is embraced in schools curriculum so that students after graduation should choose fish culture as one of the occupational areas he or she may be interested in. Osimen, (2008) has opined that students' skills acquisition is an occupational task depending basically on integration of theoretical knowledge and field practicals. The researcher has observed the challenges faced by the Secondary School Students in the teaching and learning of fish culture is the management of water resource, the insufficiency of fish culture facilities for practicals and other problems. The teachers and the students seems to have lost interest in fish culture practicals to complement the classroom instructions for the internalization of relevant experiences in pond management to boost food security, such as pond water management, such experience would provide complete and effective process that would enhance fish culture skills among the students. Water is the major facility for pond culture and therefore, the knowledge of managing the resource becomes imperative. It therefore, becomes necessary to establish the level of acquisition of relevant pond water management skills for the production of fish by the students. One may ask if pond water management skills are well taught in secondary schools could increase the rate of fish production using fish culture activities, hence the study.

Objectives of the Study

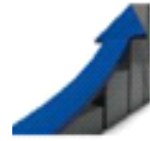
The objectives of the study are to:

- (i) determine students skills acquisition level in pond water fertilization in fish culture.
- (ii) determine students' skills acquisition level in pond water temperature control in fish culture.

Research Questions

The study seeks answers to the following research questions:

- (i) What differences exists in secondary school student's skills acquisition level in pond water fertilization in fish culture when taught with pond water management instructional module as against expository method?
- (ii) What differences exists in secondary school student's skills acquisition level in pond water temperature control in fish culture when taught with pond water management instructional module as against expository method



Null Hypotheses

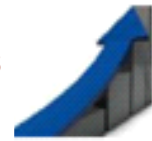
The following null hypotheses were tested at 0.05 level of significance.

- (1) **H₀₁:** There is no significant difference in the students' skills acquisition level in pond water fertilization between students taught with the instructional package and those taught with the conventional method.
- (2) **H₀₂:** There is no significant difference in the students' skills acquisition level in pond water temperature control between students taught with the instructional package and those taught with the conventional method.

Methodology

The study adopted quasi experimental pre-test, post test non randomized control group design. The study was conducted in Uyo Local Government Area of Akwa Ibom State with the total population of 6,058 senior secondary II (SSII) students offering Agricultural Science in secondary schools in the four clans of Uyo Local Government Area namely Etoi, Offot, Ikono and Oku. Intact class of two hundred (200) students were sampled and used for the experimental and the control. From each clan the schools were selected based on the following criteria, there must be availability of fish culture facilities or closeness to location of the pond, there must be qualified agricultural science teachers to handle the subject. A total of four (4) secondary schools were randomly selected by balloting to take part in the study. Two researcher developed instrument were used for the study namely; Pond Water Management Instructional Package (PWMIP) and Pond Water Management Skills Acquisition Test (PWMSAT). Pond Water Management Instructional Package contains the concepts and practices in pond water management. The students were exposed to the instructional situation (experiment) while Pond Water Management Skills Acquisition Test (PWMSAT) was used for testing the student's levels of skills acquisition. The students were observed by the regular class teachers and Laboratory assistants while performing assigned skills on pond water management in fish culture, their levels of performance were rated.

The Pond Water Management Skills Acquisition Test (PWMSAT) has two sections A-B. Section "A" sought information on students' level of skills acquisition on pond water fertilization. Section "B" carried items on pond water temperature control. Each section contains 5 items, and this gave a total number of 10 items. Scoring was based on the five levels of skills performance by the students. All the items summed up to 100% while each section was scored 50 marks. The scoring per items was based on the performance rating as shown Very high -5, High - 4, Moderate - 3, Low - 2 and very low -1. The instrument was subjected to face and content validation by three experts in the Department of Agricultural Education, Faculty of Education University of



Uyo, Uyo. Their duties were to check whether the content and the subject matter correspond with the subject matter covered by the two variables of the study and to make sure that the instrument for data collected has the required responses for the study. Their corrections and modifications were incorporated to produce the final copy of the instruments. The instrument was served to 20 respondents who did not take part in the study; but was in the same study area. Their responses were coded for analysis. Test- retest method was used to arrange the responses and treated to Cronbach Alpha Statistics. The analysis gave a reliability coefficient of .94; the instrument was therefore regarded as being suitable to collect the required data

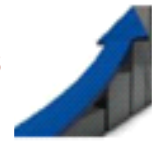
Results

Research Question 1: What differences exists in secondary school student’s skills acquisition level in pond water fertilization in fish culture when taught with pond water management instructional module as against expository method?

Table 1: Mean on Secondary School Student’s Skills Acquisition Level in Pond Water Fertilization in Fish Culture when taught with Pond Water Management Instructional Module as against Expository Method? *N = 200*

S/N	Items on Skills in Pond Water Fertilization	Item mean for Control group			Item mean for Experimental Group			Remark
		Posttest	Pretest	Difference \bar{X}	Posttest	Pretest	Difference \bar{X}	
1.	Put on protective wears (gloves, eye Glass and apron)	1.61	0.92	0.69	4.69	1.85	2.84	High
2.	Use inorganic fertilizer 15:15:15	2.03	1.06	0.97	4.36	1.64	2.72	High
3.	Fertilizer when the water temperature is 60 degree °C	1.98	1.14	0.84	4.03	1.30	2.73	High
4.	Fertilize in the morning	2.01	1.02	0.99	4.11	1.83	2.28	High
5.	Light green colouration Indicates successful Fertilization	2.05	1.12	0.93	4.43	1.02	3.41	High

The difference in item mean shown in Table 1 reveals that experimental group posttest acquires more skills than the control groups’ posttest. It indicates that students acquire more skills as a result of the use of instructional modules which promotes students active involvement and responsible for exchange of ideas. The students acquire most skill in item 5 with difference mean of 3.41 involving noting successful fertilization and least in item 4 involving fertilization in the



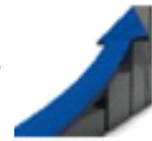
morning. All the students in the experimental group acquired high skill which has 4 point, which is high performance when taught using instructional modules, whereas the control group has 2 point.

Research Question 2: What differences exists in secondary school student’s skills acquisition level in pond water temperature control in fish culture when taught with pond water management instructional module as against expository method?

Table 2: Mean on Secondary School Student’s Skills Acquisition Level in Pond Water Temperature in Fish Culture when taught with Pond Water Management Instructional Module as against Expository Method? *N = 200*

S/N	Items on Skills in Pond Water Fertilization	Item mean for Control group			Item mean for Experimental Group			Remark
		Posttest	Pretest	Difference \bar{X}	Posttest	Pretest	Difference \bar{X}	
6.	The equipment is thermometer	2.19	1.34	0.85	4.73	2.03	2.70	High
7.	Thermometer well and place the bulb of the thermometer under the water at the depth of about 15-20cm	2.03	1.11	0.92	4.29	1.63	2.66	High
8.	Wait a short time until the column come to standstill	2.62	2.08	0.54	4.83	2.11	2.72	High
9.	Without lifting the thermometer out from the water, read the thermometer	2.24	1.93	0.31	4.39	2.02	2.37	High
10.	Light green colouration indicates successful Fertilization	2.43	1.43	1.00	3.99	1.03	2.96	Moderate

The difference in item mean shown in Table 2 reveals that experimental group posttest acquires more skills in pond temperature control than the control group posttest. The reason is that the use of instructional module promotes collaboration work and dignity to work. The experimental group acquires most skill in temperature control in item 5 with difference in mean of 2.96 involving writing down temperature in a note book for records and least in item 4 with difference in mean of 2.37 involving reading temperature inside the pond. All the students in the experimental group acquire high skill which has 4 point which is high performance, whereas the control group has 2 point which is low performance.



Null Hypothesis 1: No significant difference exists in secondary school students’ skills acquisition level in pond water fertilization between the students taught with the instructional modules and those taught with the expository method.

Table 3: Analysis of Covariance for Secondary School Students’ Skills Acquisition Level in Pond Water Fertilization between the Students taught with the Instructional Modules and those taught with the expository method

Source	SS	df	Ms	F _{cal}	F _{cri}	Decision
Covariate (Pretest)	55.38	1	55.38	4.27	3.89	
Main Effect						
Between groups	235.50	1	235.50	18.17	3.89	Significant
Within groups	2566.08	198	12.96			
Total	2801.58	199				

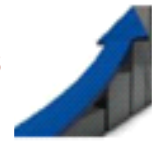
N = 200, *significant p<.05 alpha level.

The result of the analysis as shown on Table 3 indicates a significant difference in the performance of students taught with the use of instructional modules and those taught with conventional classroom strategy. The F-critical was 3.89 while the calculated F-value of 18.17 was seen to be significant at .05 level of probability and degree of freedom of 1 and 198. The hypothesis is therefore rejected. This means that there is significance difference in students’ skills acquisition level in pond water fertilization between students taught using instructional modules and those taught with expository method.

Null Hypothesis 2: No significant difference exists in secondary school students’ skills acquisition level in pond water temperature control between the students taught with the instructional modules and those taught with the expository method.

Table 4: Analysis of Covariance for Secondary School Students’ Skills Acquisition Level in Pond Water Temperature Control between the Students taught with the Instructional Modules and those taught with the expository method

Source	SS	df	Ms	F _{cal}	F _{cri}	Decision
Covariate (Pretest)	63.85	1	63.85	5.57	3.89	



Main Effect

Between groups	293.38	1	293.38	25.60	3.89	Significant
Within groups	2269.08	198	11.46			
Total	2562.46	199				

N = 200, *significant p<.05

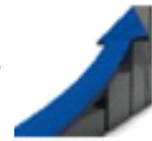
The result of the analysis as shown on Table 4 indicates a significant difference in skills acquisition level on pond water temperature control between the students taught with instructional package and those taught with expository method. The F-critical was 3.89 while the calculated F-value of 25.60 was significant at .05 level of significant and at degree of freedom of 1, 198. The hypothesis is therefore rejected. This means that there is significance difference in students skills acquisition level in pond water temperature control between students taught using instructional modules and those taught with expository method.

Discussion of Findings

The discussion was done based on the research questions and hypotheses of the study.

Pond Water Management and Students Skills Acquisition Level in Pond Water Fertilization

The study shows a significant difference in the performance of students taught with the use of instructional module and those taught with conventional classroom strategy. The reasons for this result are obvious, when students are exposed to new instructional strategy different from the use of verbalism by the teachers, students’ attention was arrested and the instruction lasted in the memory of the learners. Also, more than one sense organs are engaged and this promotes effective learning in the classroom as a result student are actively involved in the lesson and take part in their own learning. The students displayed efficient skills in pond water fertilization in support of the submission by Maar, Mortimer and Van (1996) who opined that students who are efficient in pond water fertilization are able to control the physical, chemical and biological factors that might directly or indirectly influence fish production. Pond water fertilization will enhance composition of fish population: the finding is in line with the opinion of Okeremi (1987) who submitted that when students fertilize the pond more plankton are produced for feeding of the fish. This finding is supported by Wokama (1987) and Afzal, Ruh, Akhata, Aham, Barlas and Quyyum. (2000) who submitted that pond fertilization increases primary productivity of algae and dissolve high PH and excessive phosphate content in the pond.



Pond Water Management and Students Skills Acquisition Level in Pond Water Temperature Control

The study also reveals a significant difference in skills acquisition on pond water temperature control between students taught with instructional package and those taught with expository method. The reason for this result is that students are exposed to instructional package experience collaborative learning in pond water temperature control. This strategy enhances repeated reversals of the skills in question that make the students master the technique of pond temperature control to enhance the rate of metabolism of aquatic animal. This finding is in line with the work of Frey (2006) who opined that water temperature regulates the growth, feeding, reproduction and migratory behaviour of aquatic animals including fishes.

Conclusion

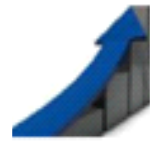
The students required skills in pond water fertilization and temperature control in secondary schools in Uyo Local Government Area of Akwa Ibom State, besides there is a significant different in students skills acquisition level in pond fertilization, pond temperature control between students taught with instructional package and those taught with expository method.

Recommendations

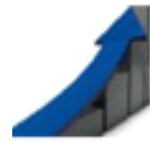
1. The State Secondary Education Board and other stake holders in education should assists all public schools by providing adequate fish pond and facilities to enhance students' skills acquisition development in fish culture
2. The curriculum planners should introduce the use of instructional modules in all public secondary and this will enhance an effective teaching and learning in fish culture.
3. The state government should organize workshop, in-service training programmes and seminars for Agricultural science teachers in public secondary schools to update their knowledge in fish farming skills.
4. Enlightenment through workshops and seminars by the state government on fish culture skills acquisition should be organize for student s and these will help and encourage the students to develop a deep interest so as to acquire skills and become self-reliance after graduation.

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