

AFA-Aquaculture Grade 9 TG

Kto12 BASIC EDUCATION CURRICULUM

ENTREPRENEURSHIP-BASED TECHNOLOGY AND LIVELIHOOD EDUCATION

AGRICULTURE & FISHERY ARTS – AQUACULTURE

Grade Level Standard:

This is a Specialization course which leads to AQUACULTURE (Entrep. Based) It covers that a Grade 9 Technology and Livelihood Education (TLE) student ought to possess, namely; 1) PECs (Personal Entrepreneurial Competencies) 2) Environment & Market, and Basic Principles in Aquaculture such as: 3) Conduct Pre-operation Aquaculture Activities 4). Changing Water of Aquaculture Facility 5) Monitor and Collect Mortalities 6.) Prepare and Secure Aquaculture Facilities.

PECs	LEARNING COMPETENCIES
<p>CONTENT STANDARD</p> <p>The learner demonstrates understanding of one’s Personal Competencies and Skills (PECs) in Aquaculture.</p> <p>PERFORMANCE STANDARD</p> <p>The learner recognizes his/her Personal Entrepreneurial Competencies and Skills (PECs) and prepare an activity plan that aligns with that of a practitioner/entrepreneur in Aquaculture</p>	<ul style="list-style-type: none"> • Assess one’s PECs; characteristics, attributes, lifestyle, skills, traits • Assess practitioner’s; characteristics, attributes lifestyles, skills, traits • Compare one’s PECs with that of a practitioner/entrepreneur • Align one’s PECs with that of a practitioner/entrepreneur
MARKET & ENVIRONMENT	LEARNING COMPETENCIES
<p>CONTENT STANDARD</p> <p>The learner demonstrates understanding of environment and</p>	<ul style="list-style-type: none"> • Recognize and understand the market in Aquaculture • Recognize the potential

<p>market in Aquaculture in one's town/municipality.</p> <p>PERFORMANCE STANDARD</p> <p>The learner independently creates a business vicinity map reflective of potential Aquaculture market within the locality/market.</p>	<p>customer/market in Aquaculture</p> <ul style="list-style-type: none"> • Create new business ideas in aquaculture business by using various techniques.
<p>CONDUCT PRE-OPERATIONS AQUACULTURE ACTIVITIES</p>	<p>LEARNING COMPETENCIES</p>
<p>CONTENT STANDARD</p> <p>The learner demonstrates understanding and skill on the preparation of tools and equipment for aquaculture operation.</p> <p>PERFORMANCE STANDARD</p> <p>The learner independently prepares appropriate tools and materials based on standards.</p>	<ul style="list-style-type: none"> • Check and clean tools and equipment. • Equipment are check based on standard procedure • Inspect aquaculture facilities and perform repair. • Perform simple repair on tools and equipment
<p>CHANGING WATER OF AQUACULTURE FACILITY</p>	<p>LEARNING COMPETENCIES</p>
<p>CONTENT STANDARD</p> <p>The learners demonstrate understanding and skills on monitoring water parameters and changing water in aquaculture facilities.</p>	<ul style="list-style-type: none"> • Monitor, record and analyze water parameters • Identify methods of changing water

<p>PERFORMANCE STANDARD</p> <p>The learners independently monitor water parameters and change water in the fishpond/tank in accordance to the standards.</p>	
<p>MONITOR AND COLLECT MORTALITIES</p>	<p>LEARNING COMPETENCIES</p>
<p>CONTENT STANDARD</p> <p>The learner demonstrates understanding and skills in preventing fish mortalities.</p> <p>PERFORMANCE STANDARD</p> <p>The learner independently monitors and regulates rate of mortality following the recommended procedures.</p>	<ul style="list-style-type: none"> • Identify the causes of stock mortalities • Calculate mortality rate • Types of predators • How to reduce mortality
<p>PREPARE AND SECURE AQUACULTURE FACILITIES</p>	<p>LEARNING COMPETENCIES</p>
<p>CONTENT STANDARD</p> <p>The learners demonstrates understanding and skills on preparing and securing aquaculture facilities</p> <p>PERFORMANCE STANDARD</p> <p>The learners independently prepare and install preventive structures based on standards.</p>	<ul style="list-style-type: none"> • Prepare the Pond properly. • Clean fishpond dikes and canals • Clean and disinfect tanks. • Check frameworks for possible damage. • Check and clean nets. • Install preventive structures during inclement weather condition. • Store tools and equipment properly

I. INTRODUCTION

AQUACULTURE is one of the *CORE COMPETENCIES* under TLE subject designed for Grade 9 students, either in the Regular High School or Open High School Program. The first part discusses the Personal Entrepreneurial Competencies (PECs) which will enable you to determine your entrepreneurial capability. The second part focuses on Market and Environment through which you will formulate a business idea based on the needs and wants of the people. The third part covers the Process and Delivery. In this phase, you are provided with various learning experiences to enable you to gain knowledge and understanding of the lessons. Each of part includes what to know, what to process, what to reflect and understand, and what to transfer. Specifically, this module purposely designed to boost the knowledge, skills and the attitudes required of the learners in Aquaculture. It includes lessons on preparing tools and equipment, monitoring and maintaining water parameters, determining and analyzing tools, preparing and securing aquaculture facilities.

Aquaculture is one of the world's fastest growing industries. The aquaculture industry will face many challenges over the next few years to be economically, socially, and environmentally sustainable. Thus, the need to educate and train the students to become globally competitive in producing aquatic products to alleviate their way of living, to sustain their needs, the community and the country as a whole.

II. Objectives

At the end of this module, the students are expected to:

1. Demonstrate understanding of Personal Entrepreneurial Competencies (PECs) in Aquaculture;
2. Demonstrate understanding of the environment and market that relates with Aquaculture; and
3. Demonstrate skills and understanding in
 - a. preparing tools and equipment
 - b. checking and inspecting harvesting tools and equipment
 - c. performing simple repairs
- 4) Demonstrate understanding in monitoring water parameters:
 - a) identify the instruments used in monitoring water parameters.
 - b) select method of water exchange
 - c) perform water exchange
5. Demonstrate understanding on fish mortality:
 - a. determine the causes of mortality
 - b. implement preventive measures in reducing mortality
 - c. follow the steps in using disinfectant to reduce mortality
6. Demonstrate knowledge and understanding in:
 - a. preparing aquaculture facilities
 - b. cleaning and repairing frames and nets
 - c. installing preventive structures
 - d. storing tools and equipment properly

III. PRE-ASSESSMENT

Ask the students to answer honestly and individually the pre-assessments for (PECS, E and M, CPOA, CWAF, DAM, and PSAF).. You will use the results to determine where your students are in terms of background knowledge, skills, their strengths and weaknesses as your bases for planning instructional activities.

<p><i>A. PECs</i></p>	<ul style="list-style-type: none">• Instruct the students to study the given situations. These are characteristics of a successful entrepreneur which will help improve theirs. Tell them to write their answers in their assignment notebooks. Pages 11-13 and 22-23.• Check their answers using the key to correction found at the end of this Teaching Guide.
<p><i>B. Environment and Market</i></p>	<ul style="list-style-type: none">• Instruct the students to answer the Pre-Assessment on pages 25 to 26 and the Post-Assessment on page 35. Tell them to write their answers in their test notebooks.• Check their answer using the key to correction.
<p><i>C. Process and Delivery</i></p>	<p>A checklist will be given to students. Instruct them to put a check opposite the items they already know and x to the items they still need to know. See page 8 of the Learner's Material.</p>

IV. LEARNING GOALS AND TARGETS

Based on the objectives of the lesson and results of the pre-assessments, let the learners define their personal goals and targets to achieve at the end of this module. Ask them to write their goals/targets in their journals.

V. PERSONAL ENTREPRENEURIAL COMPETENCIES

<i>A. Know</i>	<ul style="list-style-type: none">• Discuss the fundamental characteristics of an entrepreneur. Let the learners know the importance of entrepreneurial competencies.
<i>B. Process</i>	<ul style="list-style-type: none">• Let the learners choose five personal entrepreneurial competencies from the given PECs on page 17. Write each in the space provided and analyze each. Put a check mark in the parenthesis provided for their strength or weakness. If it is a weakness how can they strengthen it? If it is their strength, what will they do to enhance it? Instruct them to write their answer on the spaces provided for. See page 18 for Activity 2.
<i>C. Understand</i>	<ul style="list-style-type: none">• Let students deepen their understanding by analyzing and reflecting on the guides on how to strengthen their own PECs, on page 19 of the Learner's Material. Let students do Activity1 on page 20.
<i>D. Transfer</i>	<ul style="list-style-type: none">• Let the learners examine themselves once again. Instruct them to make a list of PECs that they need to strengthen. From this activity, ask them to prepare an action plan that will further develop their PECs. They may opt to follow the suggested format. They may improve or change it to suit their plans of action. See Learner's Material on page 21.

VI. MARKET AND ENVIRONMENT

<i>A. Know</i>	<ol style="list-style-type: none">1. Let the students study the lessons 1 to 4 pages 27-31 of the Learner's Material for them to know the needs and wants of people; the ways which they may generate ideas for business; selecting the right idea for business and environmental scanning.2. Guide students on how to select the right idea for business, specifically agricultural business ideas. Instruct them to give the advantages and disadvantages of the identified business ideas.
<i>B. Process</i>	<ol style="list-style-type: none">1. Let the students to study the SWOT analysis and discuss the rules for successful SWOT analysis.2. Lead students to make a simple SWOT analysis of the business they have in mind.
<i>C. Understand</i>	<ol style="list-style-type: none">1. Let the students do the Activity 1 on page 33 and 34 of the Learner's Material.2. Have a discussion about the activity.
<i>D. Transfer</i>	<ol style="list-style-type: none">1. Let the students do the activity on page 34.2. Have a discussion on the answers to the four questions.

VII. PREPARATION OF TOOLS AND EQUIPMENT

<i>A. Know</i>	<ol style="list-style-type: none">1. Let the learners prepare tools and equipment used in aquaculture, based on job requirements.2. Explain to the learners the importance of checking tools before and after use.3. Discuss the proper ways of checking tools and equipment.4. Explain and demonstrate ways of repairing tools and equipment.
<i>B. Process</i>	<ol style="list-style-type: none">1. Let the learners answer the questions on page 48.2. Discuss the answers to the questions.

<i>C. Understand</i>	<ol style="list-style-type: none"> 1. Let the students answer the question on page 48 of the Learner's Material reflecting their decision of what they will apply to improve their lives and how they will apply the knowledge they have learned.
<i>D. Transfer</i>	<ol style="list-style-type: none"> 1. Let the learners do activities 1 and 2 on page 54 of Learner's Material. 2. Let the students make a narrative report about the activities
VIII. CHANGING WATER OF AQUACULTURE FACILITY	
<i>A. KNOW</i>	<ol style="list-style-type: none"> 1. Identify the different tools/instruments used in monitoring water parameters. 2. Explain the uses of each instrument. 3. Discuss the effects of these parameters to fish stocks. 4. Discuss methods of changing water.
<i>B. PROCESS</i>	<ol style="list-style-type: none"> 1. Let the students prepare the instruments for monitoring water parameters. 2. Let them do the activity, on page 77 of the Learner's Material. 3. Let them answer the questions and make a narrative report refer to page 78. 4. Let them report in the class.
<i>C. UNDERSTAND</i>	<ol style="list-style-type: none"> 1. Explain the importance of monitoring and maintaining water parameters. 2. Let them research on how atmospheric conditions affect water parameters. (weather conditions, i.e clearness of the day, cloudiness, rainy others) 3. Let the students answer the questions on page 78. Let them write the answers in their test notebooks. Let them make a narrative report about the research undertaken.
<i>D. TRANSFER</i>	<ol style="list-style-type: none"> 1. Let the students perform the job sheet on page 78. 2. Let them give a report about the job they performed.

IX. MONITOR AND COLLECT MORTALITIES	
<i>A. KNOW</i>	<ol style="list-style-type: none"> 1. Let the students determine mortalities and explain. 2. Discuss the precautionary measures in reducing mortality. 3. Explain the steps in using disinfectant. 4. Discuss the ways to prevent predators.
<i>B. PROCESS</i>	<ol style="list-style-type: none"> 1. Let the learners study the condition of the stocks. 2. Let the learners observe how mortality occur in the pond. 3. Let the learner calculate the rate of mortality 4. Let them perform the activity on page 86. 5. Let the learner's do activities 1, 2 and 3 on pages 108 – 109. 6. Have a discussion about the activities.
<i>C. UNDERSTAND</i>	<ol style="list-style-type: none"> 1. Let the learners interview a fishpond owner see page 86. 2. Provide guide questions for the interview. 3. Let the learners record the data from the interview. 4. Let them discuss in the class the data they gathered.
<i>D. TRANSFER</i>	<ol style="list-style-type: none"> 1. Let the learners answer the questions. Why do fish kills happen? 2. Let them discuss their answers to the questions. 3. Let the learners do the activities 1, 2 and 3 on pages 109 – 110.
X. PREPARE AND SECURE AQUACULTURE FACILITIES	
<i>A. KNOW</i>	<ol style="list-style-type: none"> 1. Let the learners identify the materials, tools and equipment used in pond preparation. 2. Let them explain the process of fishpond preparation. 3. Let the learners identify the materials used to condition the pond. 4. Let the learners discuss the different steps in pond preparation. 5. Let the students identify the preventive structures for aquaculture facilities.

	<ol style="list-style-type: none"> Let the learners explain the preventive methods in securing pond facilities.
<i>B. PROCESS</i>	<ol style="list-style-type: none"> Let the learners gather information from the fishpond owner in the community. Let the learners do the activity on pond preparation on page 125. Group the students and perform the activity in securing pond facilities.
<i>C. UNDERSTAND</i>	<ol style="list-style-type: none"> Let the students identify the different materials for eliminating pests and predators. Let the students conduct a research on some organic chemicals used to eliminate pests and predators. See page 129. Let the students discuss/report in the class the gathered information they gathered. Let the learners gather information about different techniques on securing pond facilities. See page 134. Let the learners make a narrative report on the information they gathered.
<i>C. TRANSFER</i>	<ol style="list-style-type: none"> Let the learners demonstrate skills in pond preparation. Instruct the learners to have an active participation in the preparation of a pond in the community. Instruct the learners to perform the job sheet# 4-1 on page 129. Let them write their narrative report and have a discussion in the class. Let the students perform job sheet# 4-2 on page 135. Let the learners write the process they used in securing the pond.

Glossary of Terms

Aeration	-adding oxygen to water by spraying or bubbling air through the water
Algal bloom	-growth of algae covering water, or excessive growth of algae on or near the surface of water.
Aquaculture	-fishery operations involving all forms of raising and culturing fish and other fishery species in fresh, brackish and marine water areas, the rearing of aquatic organisms under controlled or semi-controlled conditions.
Cannibalism	-an act of being cannibalistic. An animal that eats the flesh of other animals of the same species.
Competition	-The struggle between organisms of the same or different species for limited resources such as food or light.
Conical	- shaped like a cone
Depletion	- to use up or reduce something such as supplies, resources, or energy.
Dike	- an embankment or enclosure of the pond to hold back the water and prevent flooding.
Disease	- any deviation from the normal state of the body of fish.
Drought	- A long period of extremely dry weather when there is not enough rain for the successful growing of crops, or the replenishment of water supply.
Equipment	- the tools, clothing or any items needed for a particular activity or purpose.
Facilities	- something designed or created to provide a service or fulfil a need.

Faulty	- containing flaws which cause malfunctioning
Fertilization	- management technique applied in fish culture to enhance primary productivity
Fertilizer	- anything added to water to make it more productive
Fish Cage	- an enclosure which is either stationary or floating made up of nets or screens fastened together and installed in the water with opening at the surface or covered and held in a place by wooden bamboo posts or various types of anchors and floats.
Fishpen	-an artificial enclosure constructed within a body of water for culturing Fish and fishery/aquatic resources made up of poles closely arranged in an enclosure with wooden materials, screen or nylon netting to prevent escape of fish.
Fishpond	- a land-based facility enclosed with earthen or stone material to impound water for growing fish.
Leaks	- an unintentional hole or crack that permits something such as liquid, gas or light to escape or enter
Lime	- a white substance used to neutralize the acidity of the soil.
Maintenance	- continuing repair work; work that is to be done regularly to keep a piece of equipment in good condition or working order.
Mortality	- the number of deaths that occurs at a specific time, in a specific group or from specific causes.
Predation	- preying of one specie on another, the relationship between two groups of animals in which one specie hunts, kills and eats the other.

Predator - destructive organism that kills other organisms in order to survive.

Seepage - slow discharge or escape of liquid.

Severe - extremely bad or dangerous.

Starvation - lack of food; the state of not having enough food, or losing strength or dying because of lack of food.

Stress - Strain felt by somebody, mental, emotional or physical strain caused by examples anxiety or over working.

Suffocation - condition caused by lack of air.

Suspended inorganic material – the colloidal clay and coarse suspensions of soil particles.

Suspended organic material - the colloidal or suspended remains of organisms of various stages of decay.

Tool - an object designed to do a specific kind of work such as cutting or chopping by applying manual force or by means of motor.

Toxic - involving something poisonous, containing a poison.

Water Quality Parameters - the sources and losses profile in the environment, which affect fish and other aquatic organisms.

Water Transparency - the condition of water with the presence of silting and non-silting suspended particles.

KEY TO CORRECTION

SUMMATIVE	TEST	Environment &Market	Quarter 1
PEC's			
Matching Type			
1. d	6. f	1. a	A.
2. c	7. e	2. b	1.d
3. b	8. j	3. d	2.b
4. a	9. i	4. c	3.c
5. g	11. h	5. b	4.c
Multiple Choice			
1. b			5.a
2. b			B.
3. d			1. A
4. c			2. B
5. b			3. A
			4. A
			5. A
			6. C
			7. C
			8. A
			9. A
			10. C
			C.
			1. ☺
			2. ☺
			3. ☺
			4. ☺
			5. ☹

Quarter 2 Changing water of aquaculture Facility		Quarter 3 Monitor and Collect Mortalities	Quarter 4 Prepare and Secure Aquaculture Facilities	
Pre Assessment	Summative Test	1. Kill 2. true 3. fishing activity 4. water 5. true LO2 1. A 2. A 3. D 4. B 5. D	1. C 2. B 3. B 4. A 5. C 6. A 7. C 8. C 9. A 10.B LO2 1. C 2. C 3. D 4. D 5. B 6. A 7. C 8. D 9. A 10.C	1.F 2.T 3.F 4.T 5.F 6.F 7.F 8.T 9.T 10.T
1. C	1. A			
2. B	2. A			
3. B	3. C			
4. D	4. A			
5. D	5. D			
6. B	6. B			
7. A	7. D			
8. A	8. B			
9. C	9. D			
10.	10.			
	11.			
	12.			
	13.			
	14.			
	15.			
	16.			
	17.			
	18.			
	19.			
	20.			

References:

A. BOOKS

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B. HANDBOOKS

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Saturno, J. O., Pond Liming. College of Fisheries, CLSU, Science City of Munoz, Nueva Ecija, Philippines. 2005.

Region 02 Technoguide for Tilapia. 1999 Revised Edition.

Aquaculture NC II Learners' Guide, TESDA-PCF (in CD)

Modules NC II Competency Based Learning Materials for Aquaculture (CBLM)

C. SOURCES OF PICTURES

Cavite State University, Main Campus, Indang, Cavite

Department of Agriculture, Trece Martires City

Aquaculture NC II Learners' Guide, TESDA-PCF (in CD)

Modules NC II Competency Based Learning Materials for Aquaculture (CBLM)

OTHERS

1. [e.n.wikipedia.org./wiki/aquaculture](http://en.wikipedia.org/wiki/aquaculture)
2. pdf-eliminating unwanted fish and harmful insects from the fishpond
3. www.auburn.edu/.../GT.4%Eliminating%.20
4. e.n wikipedia org./wiki/fish-kill