Republic of the Philippines
DEPARTMENT OF EDCUATION

K to 12 BASIC EDUCATION CURRICULUM

TECHNOLOGY AND LIVELIHOOD EDUCATION

TEACHER'S GUIDE

Exploratory Course on

AQUACULTURE

AGRICULTURE/FISHERY – AQUACULTURE
(Exploratory)

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Teacher's Guide for TLE Exploratory Course on Aquaculture

Introduction

This Teacher's Guide is intended for you, the TLE teacher, who teaches any of the more than 24 TLE exploratory courses in the Grades 7 and 8 of the K to 12 curriculum. To ensure that you teach the TLE exploratory courses the way they were intended to be taught, you must see the big picture of the K to 12 curriculum and the teaching of TLE. Some background information is necessary.

Background Information

1. The Overall Goal of the K to 12 Curriculum

   The K to 12 Curriculum has as its overarching goal the holistic development of every Filipino learner with 21st century skills who is adequately prepared for work, entrepreneurship, middle level skills development and higher education. The overarching goal of the K to 12 curriculum, tells you that the teaching of TLE plays a very important role in the realization of the overall goal of the curriculum. Whether or not the K to 12 graduate is skilled and ready for work, entrepreneurship and middle skills development depends to a great extent on how effectively you taught TLE.

2. The Conceptual Framework of the Teaching of TLE

   Below is a schematic diagram of Technology and Livelihood Education (TLE) framework in general secondary schools. This should guide you in the teaching of the TLE exploratory courses.

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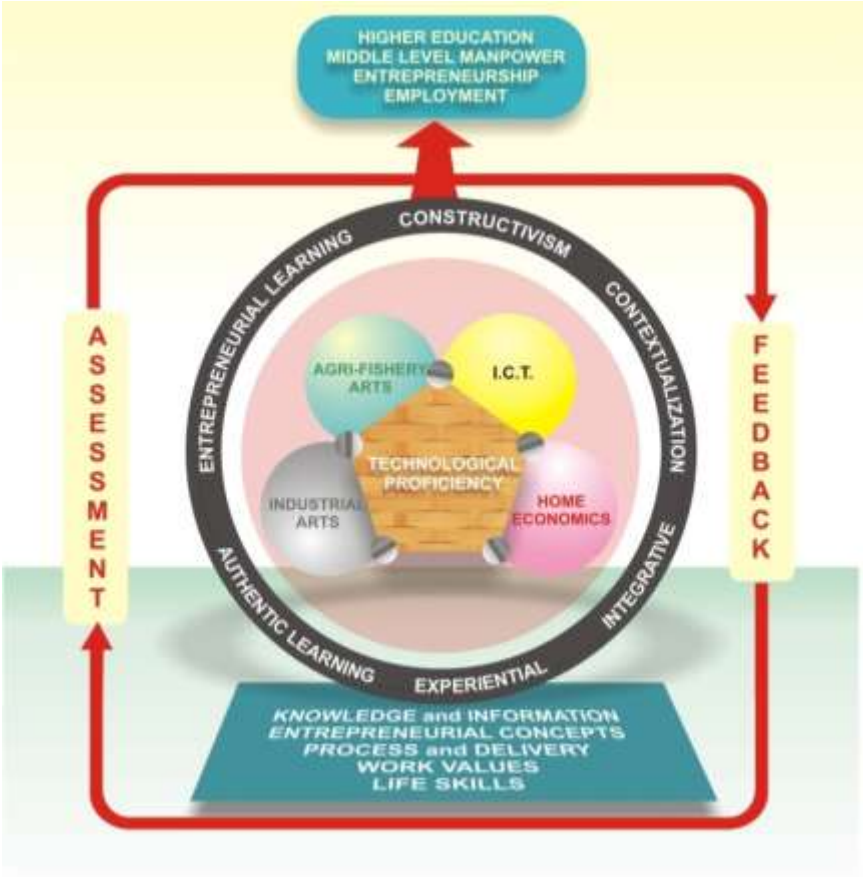

Figure 1.TLE Framework

The diagram shows that Technology and Livelihood Education encompasses the field of Home Economics, Industrial Arts, Agri-Fishery Arts and ICT. The 24 TLE courses can be categorized under any of these fields.

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TLE is geared towards the development of technological proficiency and is anchored on knowledge and information, entrepreneurial concepts, process and delivery, work values and like skills. This means that the TLE that works is one that is built on adequate mastery of knowledge and information, skills and processes, acquisition of right work values and life skills. The TLE that is functional is one that equips students with skills for lifelong learning. TLE that is concerned only with mere definition of terms is meaningless and shallow. TLE that is focused on mastery of skills and processes without right work values is anemic and dangerous. An effective TLE is one that is founded on the cognitive, behavioral or psychomotor and affective dimensions of human development. So when you teach TLE, teach facts, concepts, skills and values as a whole.

The diagram likewise shows that entrepreneurial concepts also form part of the foundation of quality TLE. It is expected that your TLE students, after using the Learning Module on Entrepreneurship, imbibe the entrepreneurial spirit and consequently set up their own businesses in the areas of Agri-Fishery Arts, Industrial Arts, Home Economics, and Information and Communication Technology.

TLE by its nature is dominantly a skill subject and so you must engage your students in an experiential, contextualized, and authentic teaching-learning process. It is a subject where your students learn best by doing. It is integrative in approach. For instance, it integrates entrepreneurship with all the areas of TLE. It integrates concepts, skills and values.

3. The TLE Exploratory Courses

TLE in Grades 7 and 8 are exploratory in nature. Your school will choose at least 4 from the list of 24 courses for which 23 Learning Modules have been prepared. [1] Your school's choice is determined by the availability of its resources (faculty and facilities) as well as the local needs and resources of the community.

The 24 TLE exploratory courses focus on four basic common competencies as follows: 1) use and maintenance of tools and equipment; 2) mensuration and calculation; 3) occupational health and safety procedures, and 4) preparation and interpretation of technical drawing. Why b are these competencies called basic ? Because they are competencies that you must acquire in order that you can do higher level competencies . They are also described common because these are true to all TR-based TLE courses.

[1] There are 24 TLE courses but there are only 23 Learning Modules because there is one Learning Module for Tailoring and Dressmaking.

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The Learning Modules and Lessons

There is a Learning Module for each exploratory course. If there are 24 exploratory courses then you have 24 Learning Modules in your hands. But you will use 4 Modules only for the entire year in Grade 7 (plus a fifth one on Entrepreneurship) and another 4 Modules in Grade 8 (plus a fifth one on Entrepreneurship). Each Learning Module consists of 4 to 5 Lessons[2]. The Lessons are focused on the 4 to 5 basic competencies. To avoid meaningless repetition of the teaching of the 5 common competencies, you have to teach them in the context of the TLE course. For example, you teach "use and maintenance of tools" in beauty care when you are teaching the course on Beauty Care. You teach the same competencies - use and maintenance of tools - in Horticulture but in the context of horticulture and so your tools will not be the same.

New Feature on the Teaching of TLE

What's new in the teaching of TLE in the K to 12 curriculum? In the K to 12 curriculum, the TLE courses are taught based on the learning outcomes and performance criteria stated on the Training Regulations (TR) from Technical Education Skills and Development Authority (TESDA). They are TR-based.

Why is this necessary? To prepare the K to 12 graduate for lucrative work, he/she must earn a National Certificate (NC) I, II or even an NC of higher level that is required by industry. This he/she earns after passing an assessment given by TESDA.

How can you ensure that the K to 12 high school student (Grade 9 to 12) pass TESDA assessment and obtain an NC? By seeing to it that you teach the TLE course in accordance with the performance criteria and learning outcomes laid down in the TESDA Training Regulations.

Do the exploratory courses enable the high school student to earn already an NC? Not yet. Completion of the exploratory courses may not yet qualify a high school student to take an assessment for an NC. Instead, it helps him/her earn a Certificate of Competency (COC) at least in Grade 9 that will lead eventually him/her to an NC. In short, the COC paves the way to the earning of an NC.

Student's choice of TLE specialization begins in Grades 9. After having been exposed to an array of TLE courses during the exploratory phase in the first two years, the student will be most benefited, if in Grades 10, 11 , or 12 he/she continues with a TLE course in which he/she already has a COC. In that way, he/she will get an NC faster.

[2] Some Learning Modules combined use and maintenance of tools to make one Lesson, so the number of Lessons amount to 4; others made separate Lessons for use of tools and for maintenance of tools, thus the total is 5 Lessons.

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About the Learning Module

1. Design of the Module

   a. The Module is designed to be a teacher-assisted learning kit or a self-learning kit on competencies that a Grade 7 TLE ought to possess. It explores the course on Aquaculture which helps your student earn a Certificate of Competency in Grade 9 which leads to a National Certificate Level I / II (NCI / II) in Grades 10, 11 or 12.

   b. The Learning Module is made up of 4 to 5 Lessons based on the competencies. Each Lesson contains the following:

      1) Learning Outcomes
      2) Performance Standards
      3) Materials/Resources
      4) Definition of Terms
      5) What Do You Already Know?
      6) What Do You Need to Know?
      7) How Much Have You Learned?
      8) How Do You Apply What You Learned?
      9) What Is Your Score?
      10) References

      There are some TLE Modules which have a section on " How Do You Extend Your Learning?". This section is meant for enrichment. It is usually given as an assignment for not everything can be taught and done in the classroom given the limited time.

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2. Parts of the Lesson - The following explain the parts of each Lesson, describe what your students' task as well as your task.

	Part of the Lesson	Students' Task	Teacher's Task
1.	**Learning outcomes** are what your TLE student is supposed to know and be able to do after using the module. Since our TLE courses are TR-based, all learning outcomes written here are lifted from the TESDA TR. In the Curriculum Guide (the matrix which contains Content Standard, Performance Standard, Learning Competencies, Projects/Activities, Assessment, Duration), the identified Learning Outcomes are written in the column of Learning Competencies.	Students acquaint themselves with the learning outcomes and performance standards and make them their personal goals.	You introduce the learning outcomes to your students and make sure that they understand them and make these learning targets their own . Make these your goals for instruction.
2.	**Performance Standards** are referred to as "performance criteria" in the TESDA TR. They are more specific descriptions of the student's behavior that serve as evidence that the expected learning outcomes have been realized with the expected level of proficiency or in accordance with established standards. The learning outcomes and performance standards set the direction of your lessons. These are what you should teach and, in turn, what you should assess. They are	Students clearly understand the performance standards and make them their own learning goals.	You introduce the performance standards to your students and make sure that they understand them and make these performance standards their own . Let these standards give your lesson its specific direction.

identified and are written for you in the Curriculum Guide.		
3. Materials and References To teach effectively, you need **materials** and **references**. Materials may include equipment, hand tools or consumables. The **references** are the books, magazines, articles, websites you yourself and your students will read or refer to in order to gain greater understanding of the lesson. They are either in soft copy or hard copy.	Get to know the materials. They are part of the Lesson. By all means, read the references for lesson mastery.	prepare the materials you need in advance. for gadget, tool or equipment, it is always wise to prepare, check and try them in advance to ensure that they function when you use them. as the saying goes "forewarned is forearmed." Be resourceful in the preparation of materials. You are strongly encouraged to use appropriate local materials as substitute for listed materials that are not available. For effective teaching, your lesson preparation should include reading the list of references. Do not limit yourself to the list of reference. If you discover good reference material/s, add to the list of references. Introduce the references to your students. Motivate them to read these references as they go through the module for lesson mastery.
4. The **definition of terms** and **acronyms** will help you understand the meaning of key words in your lesson. Defining key words as they are used in your lesson will ensure that the key terms in your lesson mean one and the same for everyone in class and so avoid misunderstanding.	Refer to the definition of terms for greater understanding of the lesson.	Remind your students to refer to the definition of terms and acronyms for clearer understanding of the lesson.
5. The section **"What Do You Already Know"** is intended to determine entry	Take the test honestly.	Tell your students to accomplish the pretest. Explain that the purpose of the pretest is to find out how much they

knowledge and skills of your students to find out if you have to teach the lesson, teach some parts of the lesson or skip it entirely because your students already know it. This is done by way of a pretest.	Check answers against the answer key provided.	already know about the lesson in order to determine your next steps. It is, therefore, necessary that they take the test honestly, if they want to learn or want to be helped. Make it clear to them that their scores will not be recorded for grading purposes and will not be taken against them. If you find out that your students already know what you are about to teach, logic dictates that you do not need to teach it anymore. You may as well proceed to the next lesson. If, however, you find out that they do not yet know what you are about to teach, then by all means teach. Or if you discover that your students have some erroneous concepts, then teach and correct their misconceptions. To know what your students already know and do not yet know will guide you in adjusting your instruction.
6. **"What Do You Need To Know?"- This section contains** one or more Information Sheets and for some modules an Operation Sheet. These are important notes for the TLE student to read after which he/she is asked to do a Self-check to determine how much he/she has learned. The self-check functions as a pretest.	Read and understand the Information Sheet/s and /or Operation Sheet. Be prepared For a Self-check which serves as a posttest. Correct answers by referring to the answer key.	Make sure students are engaged in reading the Information Sheet /Observation Sheet and in answering the self-check. Give assistance to your students where needed.
7. **"How Do You Apply What You Learned?"** – In this section, you give your student the opportunity to transfer what	Do the Activity. To determine level of	Find a way to test real life application of what your students have learned.

he/she has learned in another activity or in real life situation. Ideally, this should be a performance test, what you usually call practical test. If "the proof of the pudding is in the eating", then your student must be able to apply what she/he learned in real-life setting or must be able to come up with a product as an evidence of learning.	performance, use the scoring rubrics or check answers against the answer key, whichever is applicable? Reflect on assessment results.	Do not hesitate to use ways of determining how your students can apply learned facts and concepts which are more authentic and realistic than that/those given in the Module. Reflect on assessment results. Use assessment results in planning your instruction.
8. How Do You Extend Your Learning? – As the word implies, this activity is done outside class hours for enrichment purposes. This can reinforce lesson mastery.	Do the task assigned outside class hours.	Motivate the students to do the task by making clear what the enrichment activity is about – why it is given, how it is done, how it relates to the class lesson .

Reflection

It is a good habit to reflect on your teaching for the day – what went well, what did not go well, why this activity went well with this group, why it didn't work well with the other group. What are your realizations? What are lessons learned? Jot them down in your diary. Commit them to your memory. If you do this consistently, you will find your delivery improve substantially.

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Curriculum Guide for the Exploratory Course on Aquaculture

For you to get a complete picture of the complete TLE exploratory course on Aquaculture, you are hereby provided with the Curriculum Guide on Aquaculture.

Content Standard	Performance Standard	Learning Competencies	Project/ Activities	Assessment	Duration
LESSON 1: USE FARM/FISHERY TOOLS AND EQUIPMENT					
Demonstrate understanding of/on: • Farm/Fishery tools • Handheld tools used in aquaculture ➢ (ex. Secchi discs, digging blade, cutting tools etc.) • Safety practices during operations of farm/fishery tools	1. Appropriate farm/fishery tools are identified according to requirements. 2. Farm/fishery tools are checked for faults and defective tools are reported in accordance with farm procedures.	LO1. Select and use farm tools.	Demonstration on: • Using farm/fishery tools, equipment and facilities. • Checking and reporting for faults and defects of farm/fishery tools and equipment.	• Performance test • Written Test	4 hours
• Farm/Fishery equipment • Motorized equipment ➢ (ex. Water pump) • Electrical equipment ➢ (ex.paddle wheel, light) • Manual of farm/fishery equipment and specifications ,	1. Appropriate farm/fishery equipment and facilities are identified. 2. Instructional manual of farm/fishery equipment and facilities are carefully read prior to operation. 3. Pre-operation check-up is conducted in line with	LO2. Select and operate farm equipment.		• Performance test • Written Test	4 hours

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Content Standard	Performance Standard	Learning Competencies	Project/ Activities	Assessment	Duration
calibration and uses/functions • Aquaculture Facilities ▪ Fish tank ▪ Fish pen ▪ Fish cage ▪ Fishpond • Pre-operation and check-up • Safety practices in using farm/fishery equipment and facilities	manufacturers' manual. 4. Faults in farm/fishery equipment and facilities are identified and reported in line with aquaculture procedures. 5. Farm/Fishery equipment and facilities are used according to its function. 6. Safety procedures are followed.		• Cleaning, maintenance and storing of farm/fishery tools and equipment.		
• Preventive maintenance ➢ Safety measures and practices in cleaning and storing for different farm/fishery tools, equipment and facilities. ➢ Upkeep of equipment	1. Tools, equipment and facilities are cleaned immediately after use in line with aquaculture procedures. 2. Routine check-up and maintenance are performed. 3. Tools and equipment are stored in designated areas in line farm procedures.	LO3. Perform preventive maintenance.		• Written Test • Performance test	4 hours
LESSON 2: PERFORM ESTIMATION AND BASIC CALCULATION					
Demonstrate understanding of/on: • Problem solving procedures (formulas • Basic mathematical	1. Job requirements are identified from written or oral communications. 2. Quantities of materials and	LO1. Perform estimation.	Make a report paper on estimating cost for the development of an aquaculture	• Written test • Performance test	4 hours

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Content Standard	Performance Standard	Learning Competencies	Project/ Activities	Assessment	Duration
operations • Cost estimation of aquaculture facility construction and development. • Calendar of activities	resources required to complete a work task are estimated. 3. Time needed to complete a work activity is estimated. 4. Estimate of materials and resources are reported to appropriate person.		facility.		
• Basic mathematical operations • Systems of measurement • Units of measurement (ex. Dimensions of aquaculture site) • Conversion of units • Fractions and decimals • Percentages and ratios (ex. Feed conversion ratio) • Simple record keeping	1. Calculations to be made are identified according to job requirements. 2. Systems and units of measurement to be followed are ascertained. 3. Appropriate operations are used to comply with the instruction. 4. Result obtained is reviewed and thoroughly checked.	LO2. Perform basic workplace calculations.	Apply basic mathematical operations in fish culture: 1. Formulating a fish diet 2. Computing lime requirement 3. Computing average body weight of fish sample. 4. Measuring the area of the given facility in your school 5. Converting measurements from English to Metric System.	• Written Test • Performance test	4 hours

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Content Standard	Performance Standard	Learning Competencies	Project/ Activities	Assessment	Duration
			6. Compiling and record keeping		
LESSON 3: DRAW THE LAYOUT PLAN FOR PONDS, TANKS, PENS AND CAGES					
Demonstrate understanding of/on: • Different pond designs • Different compartments • Procedure on determining gate locations • Types of dikes • Characteristics of water supply canal • Suggested locations of stock room and other farm facilities	1. Different compartments of pond are identified. 2. Signs and symbols of plan are used according to fishpond engineering standards. 3. Lay out of different pond designs are drawn according to established procedures.	LO1. Draw layout plan for ponds.	Draw layout plan of different fishpond systems, dikes and gates with support systems; apply ratio and scaling.	• Written test • Performance test	4 hours
• Characteristic of different shapes of tanks • Different life support system for tanks	1. Different life support systems for tanks are identified. 2. Signs and symbols of plan are used according to fishpond engineering standards. 3. Lay out of different tank designs are drawn according to established procedures.	LO2. Draw layout plan for tanks.	Draw layout plan of a fish tank with its different components and support system; apply ratio and scaling.	• Written test • Performance test	4 hours
• Characteristic of different shapes of pens/cages	1. Different life support system for pens/cages is identified.	LO3. Draw layout plan for pens	Draw layout plan of a floating fish cage with	• Written test • Performance	4 hours

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Content Standard	Performance Standard	Learning Competencies	Project/ Activities	Assessment	Duration
• Different life support system for pens/cages • Characteristics of different types of cages	2. Signs and symbols of plan are used according to fishpond engineering standards. 3. Lay out of different pens/cages designs are drawn according to established procedures.	and cages.	its support system; apply ratio and scaling.	test	
LESSON 4: APPLY SAFETY MEASURES ON FARM OPERATIONS					
Demonstrate understanding of/on: • Farm works that involves using chemicals • Personal protective equipment (PPE) used in farms • Basic first aid • Farm emergency procedures regarding safety working environment	1. Safety measures are applied based on work requirement and aquaculture procedures. 2. Tools and materials are utilized in accordance with specification and procedures. 3. Outfits are worn in accordance with farm requirements. 4. Shelf life and or expiration of materials are effectively checked against manufacturers' specifications. 5. Hazards in the workplace are identified and reported in line with farm guidelines.	LO1. Apply appropriate safety measures	Role play on basic first aid practices in a workplace.	• Written test • Performance test	4 hours
• Procedure in cleaning	1. Used tools and outfit are	LO2. Safely keep/	Pictorial report on	• Written	4 hours

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Content Standard	Performance Standard	Learning Competencies	Project/ Activities	Assessment	Duration
outfits • Technique in storing materials and chemicals • Government requirement regarding farm waste disposal • Waste management system (FPA regulations, DENR laws, etc.)	cleaned, stored in line with farm procedure. 2. Unused materials are labeled and stored according to manufacturers' recommendation and farm requirements. 3. Waste materials are disposed according to manufacturers', government's and farm requirements.	dispose tools, materials and outfit.	proper ways of disposing farm wastes.	examination	
					40 hours

"By three methods we may learn wisdom: First, by reflection, which is noblest; second, by imitation, which is easiest; and third by experience, which is the bitterest."

- Confucius