Zebrafish Development Observation
Introductory Module
Elementary

Authors: InSciEd Out

Module Length (Days)	5
Module Lessons (#)	1
Module Description	This module serves as an introduction to basic zebrafish development. Students will use microscopes to observe zebrafish developing over the first 3 days of life. Students will learn how to use a microscope, basic larval zebrafish anatomy, transferring embryos and larval zebrafish, and to measure eye size, yolk size, heartbeat and angel of development.

Lesson Title *Lesson #*	Zebrafish Development and Observation		
Grade Level	Elementary	**Length of Lesson Time:**	5 days
Academic Standards/ CCF			
Lesson Objectives	The learner will be able to recognize basic parts of zebrafish anatomy at 1 - 3 days post fertilization. The learner will be able to identify at least 3 different stages of zebrafish development in the first 3 days post fertilization. The learner will be able to focus and change magnification on a microscope to observe zebrafish embryos. The learner will be able to use a pipette to transfer zebrafish embryos between petri dishes. The learner will be able to distinguish between live and dead zebrafish embryos.		
Language	*Academic Language*	*Science Language*	*Language Production Strategies*
		Zebrafish, Embryo, Chorion, Yolk, Larva, Microscope, Petri Dish	

Resources	*Materials & Technology*	*Documents & Handouts*	*Volunteers*
	Microscopes, Chromebooks D1 Zebrafish embryos (Any) Petri Dishes, Transfer Pipettes Embryo Water, Incubator Science/observation Notebook**	Alive Vs. Dead handout Zebrafish Development Chart Observation Data Sheets Lunchbox Microscope Set-Up Lunchbox Microscope Take-Down	
Essential Features of Inquiry	Learner engages in scientifically oriented questions. Learner engages in questions provided by the teacher.		
Instructional Plan	*Teacher Talk/Action*	*Student Talk/Action*	*Teaching Strategy/ Rationale Essential Feature of Inquiry*
	Day 1 1. Introduce the scientists (10 min): Manage the classroom during introduction and set-up of the microscopes. 2. Meet the zebrafish (10 minutes): Given a petri dish of zebrafish to look at using the microscope, facilitate the observation of fish. 2. Zebrafish anatomy (10 minutes): Introduction to the zebrafish embryo; chorion, yolk, and cells; labeling their drawings. 3. Why Zebrafish? (5 minutes): Why do scientists use zebrafish? Key points: a. It is easy to see inside the zebrafish as they are developing because they are transparent. b. The zebrafish develop quickly. c. They have similar body systems to humans. Day 2 1. Give students time to draw and label what they see. 2. Model to students how to measure yolk size, eye size, and angel of development.	Day 1 1. Students will learn to setup lunchbox microscope. 2. Students will learn to connect microscope to Chromebook. 3. Students will learn to focus microscope on objects around classroom (pencil, eraser, words on paper, etc) 4. Students will learn what basic parts of Zebrafish embryo are a. Chorion, Yolk, Cell b. Students will label observations. 5. Students will learn to put away lunchbox microscope. Day 2 (Zebrafish D1) 1. Students will use Alive vs. Dead handout to identify dead embryos in their petri dish. 2. Students will use pipette to remove dead zebrafish embryos 3. Students will observe zebrafish over	Introduction/Sharing. Observation and illustration. Essential Feature of Inquiry: Learner engages in question provided by teacher. Labeling

		the course of the day, drawing what they observe and labeling. 4. New Anatomy: Head, Tail, Eye 5. Students will learn yolk size, eye size, and angle of development measurements.	
	Day 3 1. Give students time to draw and label what they see. 2. Introduce and model heartbeat measurement. 3. Give time to students to measure yolk size, eye size, heartbeat, and angel of development.	Day 3 (Zebrafish D2) 1. Students will use Alive vs. Dead handout to identify and remove dead zebrafish embryos. 2. Students will observe zebrafish over the course of the day, drawing what they observe and labeling. 3. Students will continue to take yolk, eye, and angle measurements 4. Students will learn to count zebrafish heartbeats to calculate heart rate.	Labeling Collect data
	Day 4 1. Give students time to draw and label what they see. 2. Give time to students to measure yolk size, eye size, heartbeat, and angel of development.	Day 4 (Zebrafish D3) 1. Students will observe zebrafish over the course of the day, drawing and labeling what they observe. 2. Students will continue to take yolk, eye, angle, and heart rate measurements Day 5 1. Students will take median/mean of their own data 2. Students will share data with class 3. Teacher and scientists will help analyze data and reach conclusions about development with students	Labeling Collect data
	Day 5 1. Demonstrate/model how to do means/medians. 2. Visualize the class data (in graphs or tables). 3. Encourage relevant/big picture conclusions and extension to daily life.		Review Questioning & Discussion
Assessment	Student discussion, observations, and drawings of zebrafish embryos, growth over days, calculations of averages, etc.		