

Aquaculture Production in the Classroom

Teacher: Brian Waddingham
School: Baxter Community School
City/State: Baxter, Iowa

Curriculum Area: Vocational Agriculture
Grade-Level: 9-12

Video Number: 040iahs

PURPOSE:

Using previously covered material about the basics of aquaculture, students will gain an understanding and appreciation for the water conditions necessary to successfully raise aquatic plants and animals. Students will also be introduced to the practice of aquaponics. Aquaponics is a natural process that combines aquaculture with growing plants in nutrient-rich water.

BRIEF DESCRIPTION:

Students will feed all fish first. They will then perform water quality tests in all the tanks. Students will then later record test results on the computer and graph the results. Students will also catch, weigh, measure, and tag select fish. This information will also be recorded on the computer. Tanks will also be cleaned.

ACTIVITIES:

(Note: This is a unit plan that may cover several days to several weeks. Not all of the following activities/standards will appear in the video clips used.)

Preparations:	Curriculum Standards http://www.intime.uni.edu/model/content/cont.html	National Educational Technology Standards (NETS) Performance Indicators http://cnets.iste.org/sfors.htm
Introduce hobby fish in an aquarium to students. Ask students questions about the fish- feeding and water quality factors. Student-teacher discussion.	Science: A1, A2, E1, E2 Vocational Ag- Animal Care and Field Trials: 1, 2, 8	
Students list all water quality factors to consider for the species we raise. Then discuss the most important factors for the species we raise.	Science: A1, A2, B3 Vocational Ag- Animal Care and Feed Trials: 1, 2, 4, 6, 7, 8	
Procedure: Students then	Vocational Ag- Animal	Grades 9-12: 2, 5, 10

take their information and go to the aqualab where water testing kits and equipment are available. Explain how to complete tests. Students begin testing and cleaning tanks.	Care and Feed Trials: 1, 2, 4, 6, 7, 8	
Students record the data on paper and are able to check the desired quality range with the actual. Results are later transferred to the computer.	Math: 4, 5, 6, 8, 9, 10 Science: A1, A2, B3, F4 Vocational Ag – Animal Care and Feed Trials: 1, 2, 4, 6, 7, 8	Grades 9-12: 1, 2, 5, 8, 10
Once students have completed all tests, they are then able to discuss results. If all tests fall within the desired ranges, we are done testing. If one falls outside of the range, we retest. If it fails again, we begin troubleshooting to find the problem.	Math: 4, 5, 6, 8, 9, 10 Science: A1, A2, B3, F4 Vocational Ag – Animal Care and Field Trials: 1, 2, 4, 6, 7, 8	Grades 9-12: 1, 2, 5, 8, 10
Students will also have cleaned all tanks while water testing. Students will remove an uneaten feed as well as look for sick or injured fish and record their findings. This information is later put in our record book.	Science: A2, C6, E1, E3, F4 Vocational Ag – Animal Care and Field Trials: 1, 2, 3, 4, 5, 6, 8, 10	Grades 9-12: 2, 10
Students will then go into the greenhouse in order to record harvest data on tagged fish. If we catch any untagged fish we will tag them and record the data.	Math: 4, 5, 6, 8, 9, 10 Science: A1, A2, C6 Vocational Ag – Animal Care and Field Trials: 1, 2, 3, 4, 5, 7, 8, 10	Grades 9-12: 1, 2, 5, 10
In late Spring and early Fall the class visits our two grower ponds where we record water quality factors as well as harvest data.	Math: 4, 5, 6, 8, 9, 10 Science: A1, A2, C6 Vocational Ag – Animal Care and Field Trials: 1, 2,	Grades 9-12: 1, 2, 5, 10

	3, 4, 5 7, 8, 10	
All students will then go into the classroom and look at water quality results and harvest data. Discuss any major differences in water quality factors. Begin entering data on the computer.	Math: 4, 5, 6, 8, 9, 10 Science: A1, A2, B3, E1, E2 Vocational Ag – Animal Care and Feeding Practices: 1, 7	Grades 9-12: 2, 5, 8, 10
One student enters the information while the others help. Print off a copy and put it in the record book. Install harvest data on graph sheet and print.	Math: 4, 5, 6, 8, 9, 10 Vocational Ag – Animal Care and Feed Trials: 1, 7	Grades 9-12: 2, 5, 8, 10
Once new information is added to the record book, students now look at the results to see if any patterns are developing with water quality. Students can also look at the graph to see the growth rate of the fish.	Math: 4, 5, 6, 8, 9, 10 Vocational Ag- Animal Care and Feed Trials: 1, 7	Grades 9-12: 9, 10

TOOLS & RESOURCES:

Hardware:

Macintosh Power PC 5260-100. Apple Corp. Available: <http://www.apple.com>.
Color Style Writer 2500 Printer. Apple Corp. Available: <http://www.apple.com>.

Software:

ClarisWorks 5.0. Apple Corp. Available: <http://www.apple.com>.

Book:

Parker, R. (1995). Aquaculture Science. Delmar Publishers.

Testing Equipment:

Freshwater Aquaculture Test Kit – Model AQ-2/AQ-3. Lamont Company: Chestertown, Maryland.
Temperature Plus Oxygen Meter. Environmental Concepts: Ft. Lauderdale, Florida.

ASSESSMENT:

I use something similar to a rubric. It is called Snapshots and Benchmarks.

CREDITS:

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TIMELINE & COURSE OUTLINE:

This activity is the main part of the entire course. Each fall students in the class get to decide what species of fish they would like to raise based on classroom discussion. Once fish arrive, students are in charge of raising, marketing, harvesting, and processing the fish. They are responsible for making sure those fingerlings we receive in September are sold as adult fish in May.

COMMENTS:

This is one of my favorite areas to teach because student interest is so high. From the program's beginnings in 1997 with four aquariums to today's 2700 gallon operation, students have a lot of fun and learn a great deal about animal husbandry. They also learn a lot about math and science along with technology. The e-Mate computers we used for a year and a half through a grant from AEA 11 really helped the aquaculture program take off.

Technology Resources:

The technology used that started the water quality testing and harvest data was what we are using now. (pH meter, Water quality test kit) In the spring of 1998 and all of 1999 I received a grant from AEA 11 to use 32 e-Mate lap top computers complete with water quality probes. Students really enjoyed the computers. When we had to give the computers back we went back to using the test kits again. The test kits do a very good job and are simple to use, but lack the technology of the e-Mates.

Teaching Strategy:

I selected this "hands on" teaching strategy because I felt it was the best way to gain student interest in the relatively new field of aquaculture. By giving students the responsibility of raising fish I felt they would take real ownership of the fish and work that much harder to make sure they reached market. Although I teach Agriculture, the majority of my students do not live on farms. Therefore I was looking for a non-traditional ag production course to show students that today's agriculture is more than just cows, sows, and plows.

Technology as Facilitator of Quality Education Model Components Highlighted in This Activity <http://www.intime.uni.edu/model/modelimage.html>

(Note: This is a unit plan that may cover several days to several weeks. Not all of the elements from the Technology as Facilitator of Quality Education Model that are described below will appear in the video clips used.)

Learning:

We practice a lot of hands on learning. The students also are involved in *Informal Learning* while using the test kit.

Information Processing:

The students developed an *Appreciation* for the fish. I then gave them background information. They *Interpreted* this information and began asking questions. Then they were given hands on opportunities to work with the fish.

Content Standards:

This lesson included national standards from the following areas: *Vocational Ed.*, *Science*, and *Math*.

Democracy:

The students demonstrate *Tolerance* while working in non-biased, cooperative learning situations. The students share results, trouble shoot problems, and fix those problems using *Critical Thinking and Decision Making*. , They also display *Individual Responsibility* by finding the best way to get the work done.

Technology:

Throughout this activity, the students used the following technology equipment: web page, computer, printer, software, spreadsheet, graphing, test kit, temp/oxygen meter, pH meter, and textbooks.

Teacher Knowledge:

I must keep in mind the different learning styles of my students. Some students work better while participating in individual and small group work. Typically, the group members discover that one of them likes cleaning tanks better while another student may enjoy testing the water better.

Teacher Behavior:

It is very important to run a well-organized classroom and present material in a way that is fun for the students and will allow them the flexibility to learn what they want about the material.

Student Characteristics:

It seems every class wants to learn something different about aquaculture. I teach a basic outline and then have the students decide what they want to learn more about. Once they decide I give them the information they are most interested in. Smaller classes have more fun because there isn't as much sharing of equipment going on which means they have more control of what they want to do.

Evolution of the Activity:

This activity has evolved very rapidly since its beginnings in 1997. We now have (3) 650 gallon tanks, (2) 300 gallon tanks, and (3) aquariums we use. I have also added a Natural Resources II class to assist the Aquaculture class. We have also received a \$10,000 grant from RACI (Prairie Meadows) in which we constructed a new classroom/greenhouse. The old classroom is now our new aqualab, which doubled in size. We have also went from raising minnows to now raising channel catfish, rainbow trout, bluegill, and largemouth bass. We have also started an aquaponics operation where we raise tomatoes and fish together in the same tank.

(Learning activity format adapted from *National Educational Technology Standards for Students Connecting Curriculum & Technology* <http://cnets.iste.org/index2.html>)