Biology: Appreciating and Applying

An Introductory Lesson

By

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Biology or Life Science is a required class in most if not all high schools. It also is part of the Michigan Curriculum Framework (Science) and is a major component of the MEAP test (Michigan Department of Education, 1996). Biology is ever present and essential. The goal of this unit is to invoke interest, explore life, and present relevancy from the start. The intended result is to capture student interest and generate enthusiasm from day one in Biology class.

As adults, we know that knowledge is eternal - no one can take it from us. However, often students question the relevance of a particular class if they think they know what they want to be. They feel that the particular class will not be of value to them. What students do not know is that they are learning how to learn. Being a lifelong learner, taking classes, reading, being open to new ideas, and admitting that I do not know the answer to all questions sets the stage for inquiry - learning together.

Imparting the love and value of science is a difficult task because each student has a different set of expectations and schema. Confucius stated, "I hear and I forget. I see and I remember. I do and I understand." Carl Sagan reinforced this, "When you make the finding yourself - even if you're the last person on Earth to see the light - you'll never forget it." "Doing" and "Finding out" are most successfully accomplished through hands-on activities, group work, and critical thinking.

This five-class period unit explored biology and life first-hand and related prior knowledge to current everyday activities. The materials consisted of typical biology classroom supplies. Each class period involved numerous interdisciplinary activities - inside and outside, individual, group, reading, writing, speaking, and drawing. The daily lesson materials and expected time frames are outlined below.

Day 1

Two pretests were given: a science attitudes pretest developed by ESMIS and a biology knowledge test developed by the instructor. These were not graded but were used as a success gauge. (15 minutes)

Activity 1 - 20 minute total

Students worked in groups of three and brainstormed about and/or answered the following questions on a handout.

- What is Biology?
- List at least 5 fields of biology, i.e. Anatomy.
- List at least 10 careers involving biology.

After working in groups for approximately 10 minutes, a classroom discussion of student generated ideas followed. Each group contributed one unique field of biology and two
careers involving biology.

**Activity 2 - 5 to 10 minutes**

Students independently generated an "I wonder..." statement or question. Each wrote down and submitted something biological that they did not know the answer to or something that puzzled them.

**Homework - Due in 2 class periods**

Each student was instructed to find a newspaper, magazine, or journal article that related to biology, read the article, bring the article to class, and tell the class about the article. Short informal (2 minutes) presentations were given in class two days later.

**Day 2**

**Activity 1 - 35 minutes**

Part 1

Students, in groups of two, went outside, found, and brought in an example of something living. Jars, baggies, petri dishes, and nets were available. The "living" specimen had to fit inside their container. Destruction of the specimen was not allowed. (10 minute maximum)

Part 2

Back in the classroom, students, using the naked eye or a dissecting microscope, described, observed, and recorded details pertaining to their organism on paper. The students were asked to answer the question "How do I know that it is a living thing?" After students completed making observations they were encouraged to view other student's specimens. Finally, students released their uninjured specimen outdoors. (15 minutes)

Part 3

The class discussed their findings. (10 minutes)

**Activity 2 - 15 minutes**

Students discussed "How biology relates to me?", "Why study biology if I want to be a ____________ ?", and "Why biology is important?" in groups of four. A class discussion followed.

**Homework**

A reminder of the previous day's homework assignment was given.

**Day 3**

**Activity 1 - 25 minutes**

Students told about the article they found that related to biology. Only half of the students presented on this day. If a student presented, he/she received 10/10 points.

**Activity 2 - 25 minutes**

In groups of two, students participated in an activity demonstrated at ESMIS and developed by Joseph Cornell, the author of *Sharing the Joy of Nature: Nature Activities for All Ages* (1989). It is called "camera" and one student acts as the camera and the other as the photographer. The person acting as the `camera' closed his/her eyes and was led to a location and positioned to observe something by the `photographer'. The photographer turned the camera on and off by a tap. At this cue, the camera opened (observes) and closed (remembers). The camera was able to shoot close-up (telephoto) or wide angle depending on how the photographer positioned the camera. It was recommended that the camera be turned on for four to five seconds. No talking was to take place during this activity. Each student acted as the camera and photographer three times. (15 - 20 minutes) Back in the classroom, each student was given an index card and was told to develop one photograph by drawing it.

**Day 4**

**Activity 1 - 25 minutes**
Students finished presenting their articles.

**Activity 2 - 25 minutes**

In groups of three, students participated in a biology scavenger hunt. Groups went outside and looked for 20 assigned items; some items were very specific and others were general. The collected item could fit into more than one category. The items had to fit in a lunch bag. Students had to be able to justify and explain the selection to the class. Fifteen minutes were provided for collection and discussion followed. The discussion was outside.

**Day 5**

**Activity 1 - 35 minutes**

Students went to the media center and found the answer to their "I wonder...". Students used the internet, encyclopedias, or other sources to quickly explore their topic. (25 minutes) Back in the classroom, students wrote one paragraph that briefly described their topic or answered their question. (10 minutes)

**Activity 2 - 15 minutes**

Students worked in groups of three and selected the best, worst, and most valuable activity of the last five days. Students had to be able to tell why they put the activity in that category. Then as a class, we put all the pieces together and discussed why we did the activities and what the goals and intended outcomes were.

**Day 6**

**Follow up - 15 minutes**

Students took the post-tests, the exact test used for pretesting.

**Homework - Due in one week**

Students composed a one-page type written essay addressing the importance and relevancy of biology. This was written using ideas generated in class in addition to prior knowledge and values.

The Michigan Curriculum Frameworks addressed in the above unit were:

Construct New Scientific and Personal Knowledge

**Content Standard**

- Develop questions or problems for investigation that can be answered empirically.
- Gather and synthesize information from books and other sources of information.
- 1.8 Reconstruct previously learned knowledge.

II. Reflect on the Nature, Adequacy and Connections Across Scientific Knowledge

**Content Standard**

- Justify plans or explanations on a theoretical or empirical basis.
- 1.3 Show how common themes of science, mathematics, and technology apply in real-world contexts.


**Unit Analysis**

The unit exploring biology first-hand was a successful interdisciplinary lesson. Each days activities and student responses are summarized below.

**Day 1**

All the activities went well. The biology pre-test indicated that most students knew very
little about biology, careers, etc. The group brainstorming and classroom discussion cleared up misconceptions regarding biology. Students came up with excellent "I wonder..." statements.

**Day 2**
The first activity involved locating and observing a "living" specimen. It was interesting to note that all students collected animals - worms, amphibians, insects or arthropods. Plants, mushrooms, twigs and pine cones were not collected. Students equated "living" with moving. Students enjoyed this activity and made excellent observations. The group and class discussions of the importance and relevance of biology produced some interesting ideas.

**Day 3**
Students told the class about recent newspaper/magazine articles. The articles the students chose varied from medical advice and health/nutrition to hunting and environmental issues. This activity was found to be very valuable. One problem that was encountered was that often two or three students had the same article. When this happened, the other students with the same article would have to add information to what the earlier presenter said. If the entire article was covered, opinion relating to the issue was added so that each student contributed to the discussion. The second part of the day involved the activity called "Camera". The 10th grade students were not receptive to this. Many students were off task and fooling around. Also there was little diversity of non-human biological photo opportunities.

**Day 4**
Students finished presenting their articles. The second part of the day, the scavenger hunt, found a lot of enthusiasm. Students gathered a variety of different specimens to fit in the 20 categories. Student justifications were thoughtful and creative.

**Day 5**
Half of the day was spent in the media center. Students looked for the explanation or answer to their "I wonder...". Most students found reasonable answers. However, some had to refine their question once they examined the media. Students presented their findings to the class. This prompted a lot more "I wonders...". The second part of the day was spent evaluating and validating the activities of the previous days. Student responses were similar to those presented earlier.

**Day 6**
The last day involved post-tests. The science attitudes results generally improved or stayed the same. The biological knowledge results improved significantly; the pretest average was 55%, while the post-test average was 89%. The week's activities promoted knowledge of biology. The closing assignment, an essay discussing the relevancy of biology, went well. However, the amount of time and quality varied. Students realized the importance but the overall conveyance, writing, grammar and direction following was not what was expected.

**Overall Analysis**
Overall, the unit was a success. The only thing that will be changed for next year is that the "Camera" activity will be omitted. Also, the final paper criteria will be better defined. The student enthusiasm was great and the unit ended with students wanting to know when we were going to do certain activities or learn about a particular topic. The unit fulfilled the intended goals.

**Bibliography**
Lansing, MI: Michigan Department of Education.