DEVELOPMENT AND IMPLEMENTATION OF THE WOLF WORKBOOK AS A SCIENCE EDUCATION TOOL FOR STUDENTS AND TEACHERS

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Final Presentation for Master in Wildlife Science

Texas A&M University

Introduction

- High school teacher
  - Personal experience, reading, teaching, synthesis of information
  - Observations of technology, the scientific method
  - Observations of other teachers
  - Current use of wolf workbook

Introduction

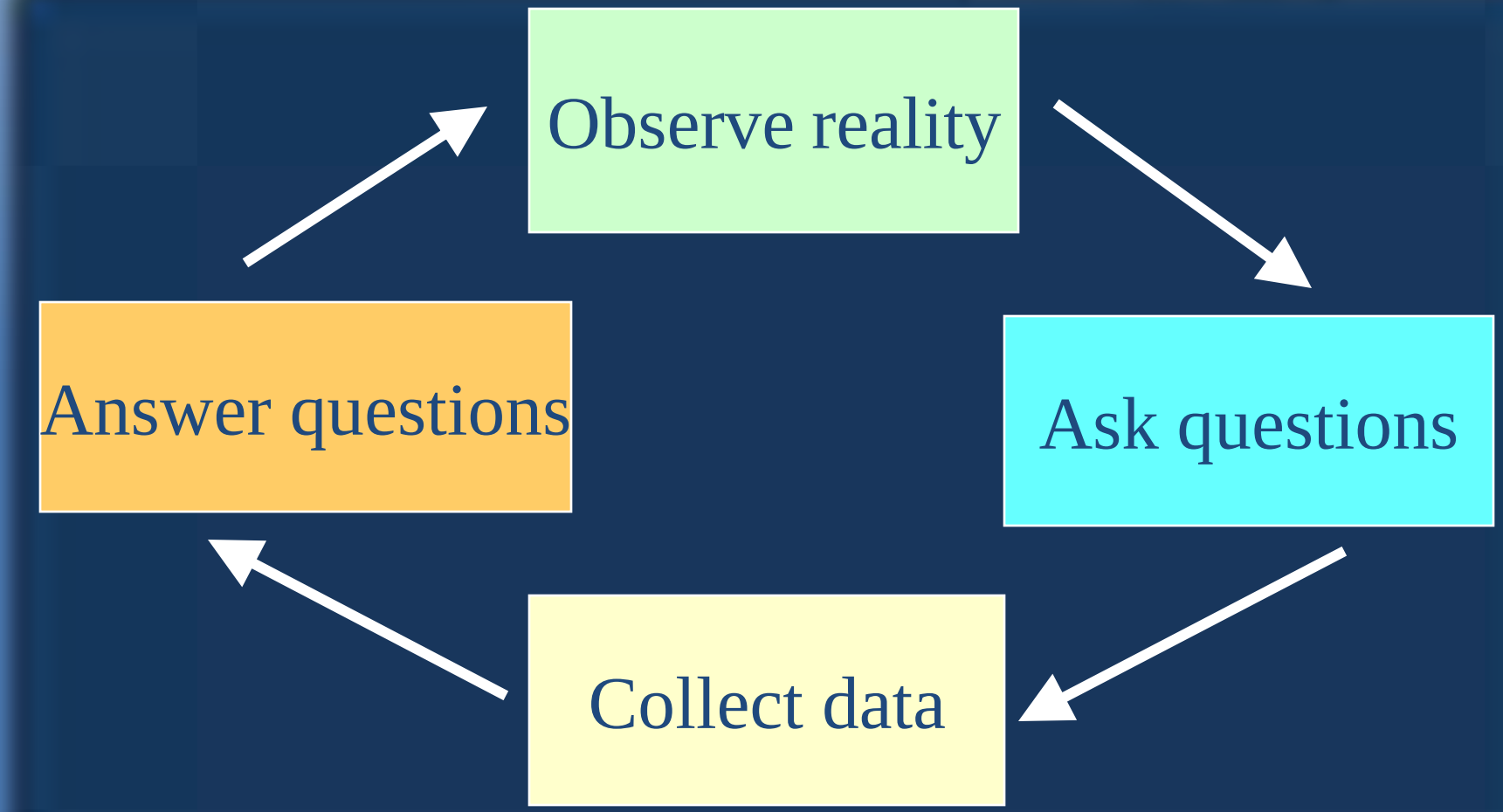
Education and technology

- Problems
- Connection to science
- Connection to teachers

Introduction

- Professional support for teachers
  - What is available?
  - Who is responsible?
  - Will teachers accept the Wolf Workbook for use in the classroom?
  - How can we teach inquiry through a PD program to connect teachers and scientists?

Inquiry-based learning



SCIENCE IN ACTION!

Wolf Workbook

Frequently Asked Questions (FAQ)

OBSERVATIONS
- O1 Dog Pack
- O2 Wolf Pack
- O3 Wolf Family

creating mental models

ASK QUESTIONS
- Q1 Folk Psychology
- Q2 Social Structure
- Q3 Social Function

designing experiments

MEASUREMENTS
- M1 Units of behavior
- M2 Social distance
- M3 Resource distance

testing hypotheses

ANSWER QUESTIONS
- A1 First sources
- A2 Captive studies
- A3 Field studies

revising mental models

TIP: to return to the START page, click on the Wolf Icon; to read more tips, point your cursor at the red triangles.

MAP FAQ SOURCES

Name:
Date(s):
Time (hour):

O1 Dog pack

STEP 1 Watch a video clip about dogs, carefully observing the behavior. Then, write notes on what you observed and learned. **SAVE**. *OPTION: Listen to the voice in the video to help understand what you saw.*

STEP 2 Learn to tell the difference between observations, "inference" and questions (?), by using the categories at the bottom of the page. Discuss with your classmate and teacher. *OPTION: Show your teacher that you understand these words: underline your observations; place quotes around phrases that are inference; add question marks. You may replay the clip to find evidence to support your opinion.*

STEP 3 Repeat for the second clip. Remember to save your notes by clicking on the **"Save"** icon that looks like a diskette. Be sure that all the white boxes are filled in before you hand in your worksheet. *OPTIONS: Take your own video of dogs and watch it.*

VIDEO	GENERAL NOTES ON WHAT HAPPENED
clip 1	*Type your notes here!*
clip2	

CODE	CATEGORY	DEFINITION	EXAMPLE
?	**Question**	what I'm curious to learn more about, to better understand what I observed; my hypothesis about cause/effect	I wonder if the dog at the front of the pack is a female in heat?
underline	**Observation** (direct evidence)	what I actually saw, heard, smelled, or otherwise sensed about the animal and its environment	I saw individual dogs from separate yards jumped over fences and joined the group of dogs roaming the neighborhood
"quotes"	**Inference** (indirect evidence)	what I (or others) think about what I observed; my underlying mental model	"I think many dog packs are made up of males that are attracted to a female in heat"

MAP | FAQ | SOURCES

Name:
Date(s):
Time (hours):

Q1 Folk Psychology

STEP 1 Discuss what the words "Folk Psychology" mean to you, and how we sometimes talk as if dogs think and feel like ourselves. Type your ideas in answer to questions #1 & #2. SAVE. *OPTION: To find what scientists think about these words, click on the wolf icon and follow the links to "Information" and "Folk Psychology"*

STEP 2 Think of some groups of which you are a member, for example: family, church, team, club, class. Discuss how people get along in these groups. Answer questions #3 and #4. SAVE. *OPTION: Draw boxes on a chart to illustrate how people are close or far apart in one group. Draw thick arrows between people who talk frequently and thin arrows between people who don't talk much.*

STEP 3 Think of a group of dogs that you have watched. Discuss how the dogs get along in their group. Answer questions #5 & #6. SAVE. *OPTION: Draw a chart to illustrate how the dogs interact, learning from what you did for people in STEP 2.*

Question 1: What is Folk Psychology? How do we use it to think of hypotheses about behavior?

My answer:

Question 2: Do dogs really think and feel like humans?

My answer:

Question 3: What are some social groups to which you belong?

My answer:

Question 4: Compare and contrast the structure of your social groups?

My answer:

Question 5: What are some groups of dogs that you have watched?

My answer:

Question 6: Compare and contrast the structure of dog groups you have watched?

My answer:

MAP FAQ SOURCE

Name:
Date(s):
Time (hours):

M1 Units of behavior

STEP 1 Discuss what actions you would consider to be friendly and unfriendly behavior in groups of people a dogs; write your ideas in the top 4 boxes below. **SAVE**.

STEP 2 Discuss dominant and submissive behavior in people and dogs, then write examples of actions you believe would fit in each category (use the bottom 4 boxes) **SAVE**.

STEP 3 View as many of the video clips as you have time. Add to your lists in each of the 8 boxes. Discuss. **SAVE**. *OPTION: Watch (or videotape) a group of real dogs and add to your list.*

clip 3 clip 4 clip 5 clip 6 clip 7 clip 8

Type of behavior	My ideas about examples of body language for this type of behavior in: PEOPLE	DOGS
Friendly		
Unfriendly		
Dominant		
Submissive		

TYPE	MEANING	EXAMPLE
Friendly	Actions that bring individuals closer together	smile, laughter, gentle touch, backslap
Unfriendly	Actions that make individuals more distant	frown, yelling, hit, slap in face, shaking the fist
Dominant	Assertive actions that control the access of others to something they might want (resources).	cutting in line, taking another's food, sitting in another's chair
Submissive	Appeasing actions that reduce the probability of conflict.	hunched shoulders, turning away, sad face, closing the eyes, looking down.

MAP | FAQ | SOURCES

Name:
Date(s):
Time (hours):

A1 First sources

STEP 1 Divide into groups and choose a source to read about dog behavior, which you would like to describe to the rest of the class. Answer Question #1. **SAVE**. *OPTION: Use the sources written by Darwin, Tinbergen & Lorenz linked to the SOURCES page in the info folder on this CD. Answer the Bonus questions.*

STEP 2 Read your source and summarize what the author said, using your own words. Write your answer to Question #2 in the box. **SAVE**. *OPTIONS: Read your answer to the class and discuss. Play charades and act out the behavior to see if other groups can guess it.*

STEP 3 Discuss what was inference and what was observation in the source you read. Answer questions #3 & #4. **SAVE**. *OPTION: Report your findings to the class.*

STEP 4 Choose a second source. Discuss similarities and differences between the two sources. Answer Questions # 5, #6, and #7. **SAVE**. *OPTION: Write a report on dog behavior, using several sources and explaining why sources might differ in how they describe dog behavior.*

Question 1: What is your source of information about dog behavior?

My source:

Question 2: In your own words, what information about dog behavior was in this source?

My source said:

Question 3: What statements in your source were direct observation (evidence)?

Observations:

Question 4: What statements in your source were indirect inference (Folk Psychology)?

Inference:

Introduction

- Goal and objectives
  - What are the barriers to adoption of the Wolf Workbook as a science education tool in the classroom?
  - Evaluate perspective of in-service teachers through PD and pre-service teachers
  - Introductory materials
  - Future recommendations

Methods

- Participant Observation
  - Personal experience as a graduate student in behavioral ecology
  - The “Hook”
  - Transition from student to teacher

Methods

- Data Collection
  - Synthesis of information (rather than analysis)
  - Document Analysis
    - Scientific journals
    - Education texbooks
    - Informational articles (USFWS)
  - Informal Discussion/Interviews
  - Bellamy's program piloted the workbook in real classrooms
  - Milam's PD for middle school teachers

Evaluation Results:

Professional Development workshop survey responses

Table 1. Professional development workshop survey responses

What are your expectations for this workshop?
To learn new and exciting ways to engage students in the science classroom.
To get a better understanding of the behaviors of a wolf. I hope to end my year with this project.
Learn something new about wolves and incorporate it into my teaching.
Learn how to incorporate wolves into middle school science curriculum making it interesting/engaging.
Looking for an inquiry based lesson to incorporate behavior, evolution of behavior to integrate
What did you find appealing about the wolf workbook?
Inspiring and exciting for me and I am sure it will be totally engaging to even the most slug-a-bed students.
Using video clips to introduce the subject and prompt inquiry!
Everything, it seems extremely user friendly.
Very interesting, makes me want to learn more.
Will work for a variety of levels of students – high interest.
Adaptability of the workbook (excel), and adaptability of the resources to all levels of students.
The interactive set-up of the excel workbook, video clips, and authentic science research.
Covering so many 6th TEKS that are connected to my districts scope and sequence.
Regarding the wolf workbook, what worked for you?
Inferencing (one of our lowest performing TEKS), research skills, inquiry.
All of it!
The ethogram is great along with all of the resources.
Video and sources
I appreciate all of the tips throughout the workbook pages, easy to understand.
The CD was understandable and easy to follow.
Workbook is user friendly, I like the included tips.
Regarding the wolf workbook, what didn't work?
Social distance was more difficult. Names of wolves would be helpful for clarification and identification.
Time, I wonder if I would be able to devote the proper time to this that is required with my current curriculum requirements
Identifying the alpha, beta, gamma, and omega wolves.
Too much sexual behavior.
Nothing, I don't know much about wolves but we would learn together.
Suggestions
On page M2, a table to label and describe the different wolves.
A section for teachers comments on student work.

Implementation

- Secondary Schools
- TEKS

Table 2. List of middle school science essential knowledge and skills

Source: Texas Education Code - Science

- provide clear, concise statements of what students should know and be able to do;
- encourage schools to select instructional approaches best suited to their local needs;
- focus in great depth on selected topics at each grade level;
- provide students with the skills to solve complex problems related to the world outside of school;
- provide content depth to ensure students' understanding of science in Grades K-12; and
- move cautiously, but meaningfully, toward a world-class system that develops Texas students as competent, technologically-literate problem solvers.

Table 3. Selected examples of how the Wolf Workbook relates to the Texas Education Code.

Worksheet #	*TEKS #*	*Knowledge Tested*	*Skills tested?*	*Workbook application*
Q1, Q2, Q3	(6.10)(A)	Differentiate between structure and function		Blue worksheets: Cause questions address social structure and Function questions address function
M1, M2, M3	(6.20)(C)		"analyze and interpret information...from direct..evidence	Yellow worksheets: direct evidence is from measurements.

Greenbrier Wolfpack Football

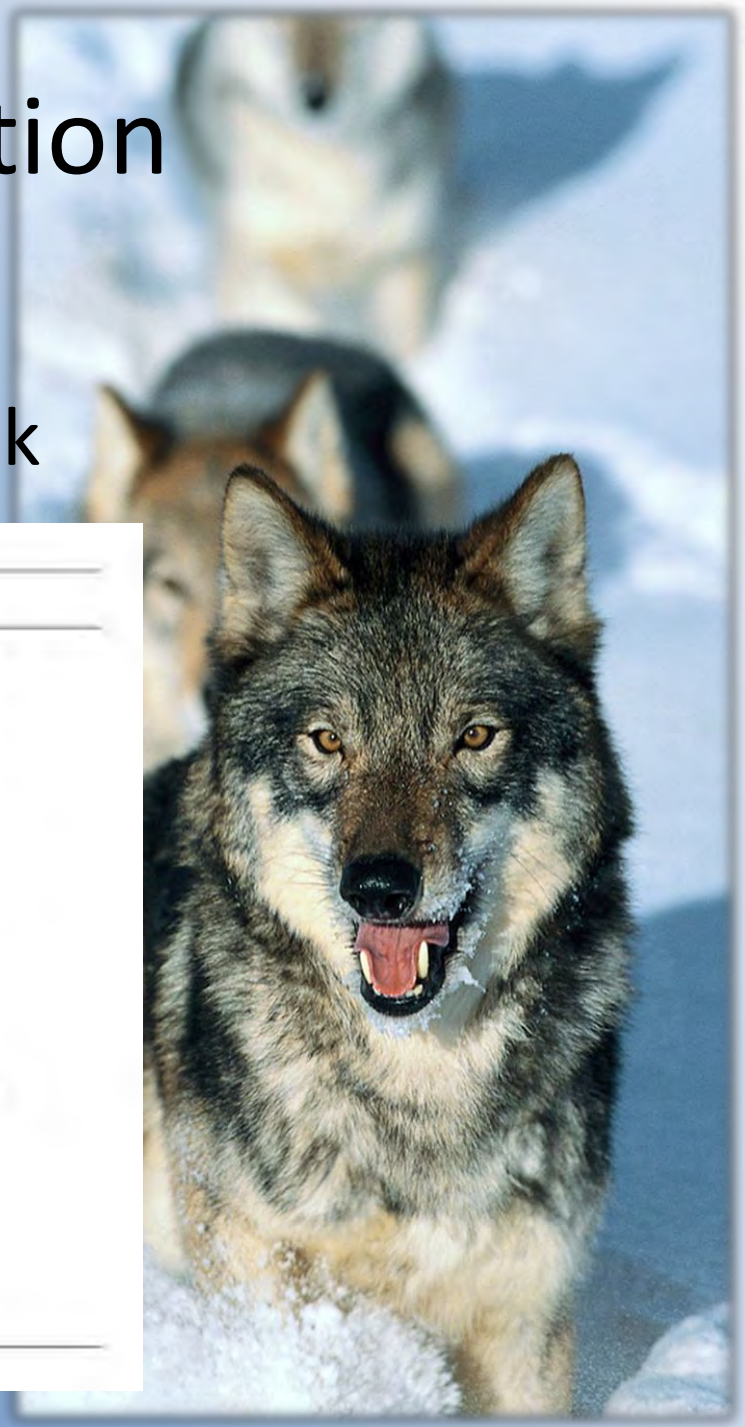
- Student Response
  - Middle School
  - High School “wolfpack”

Implementation

- Public Education
- Success of the wolf workbook

Table 4. Undergraduate student comments

Question	Student Comment
What worked?	Working green-blue-yellow-orange and cycling worked better than working each section all at once.
	What we were able to cover was great, very understandable.
	I liked the order of the workbook.
	This workbook was much easier to go through and figure things out on my own. My confidence level was much higher than on a previous workbook.
Suggestions	Use this workbook to build confidence
	Try to streamline each session more. In the video folder, name each clip with which section it belongs to so if the link is broken we can work around it.
	If possible for the next workbook maybe 2 or 3 examples instead of 3 or 4 so that the cycle will move more quickly.



Results

- Professional Development and classroom implementation surveys showed barriers to adoption.
- Supporting Materials were added

Supporting Materials

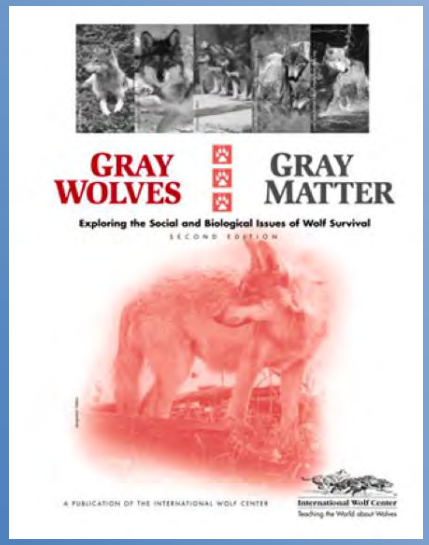
- Ethogram

Figure 1. Example photo of the action "Yawn"(photo credit to International Wolf Center Exhibit Pack, Maya)[2]

Figure 2. Example of behavioral states, as defined in the unpublished ethogram provided with the Wolf Workbook: sitting, running, least self-secure (adapted from Abrantes 1997)

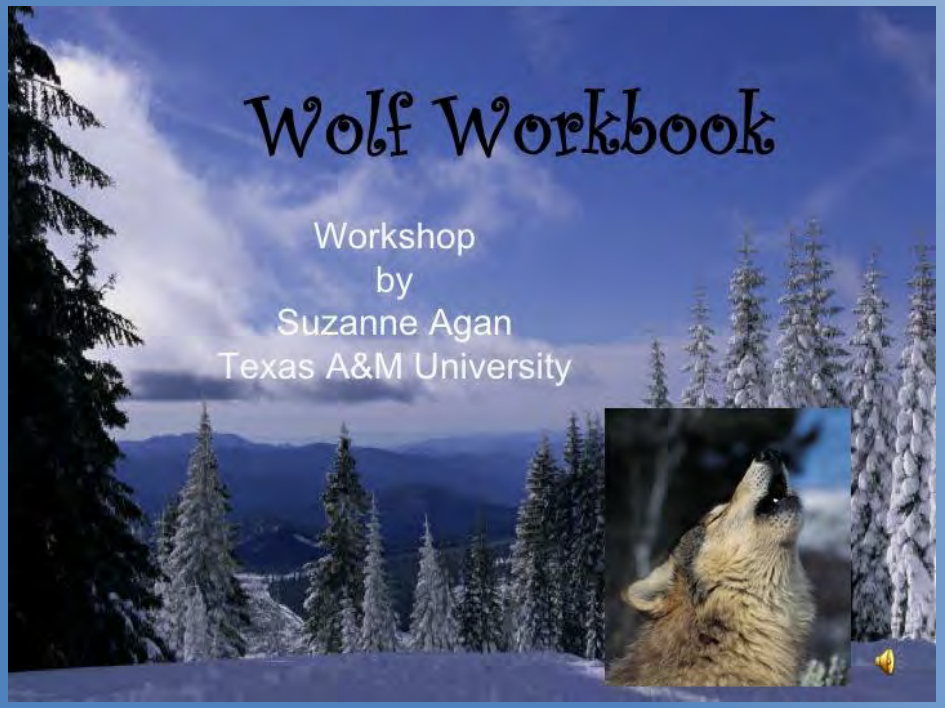
Supporting Materials

- Teacher Tool Kit
  - International Wolf Center
  - Dr. Jane Packard, Ethology Lab

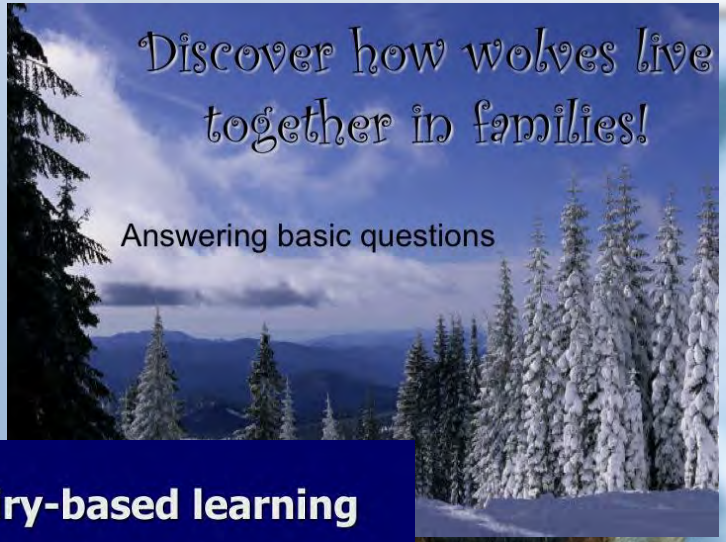


Supporting Materials

- PowerPoint Presentation
  - PD
  - Middle School Class



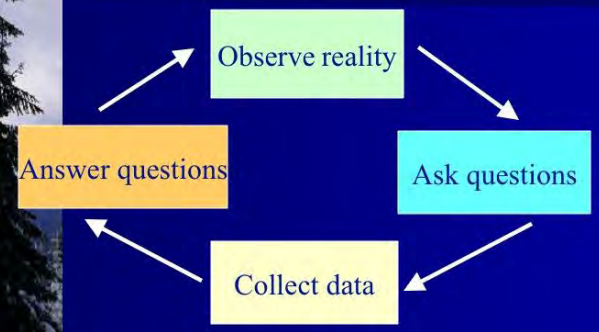
Professional Development



About the Wolf Workbook

- Useful for elementary through college
- Each section is adjustable for appropriate age level
- The workbook applies to TEKS §112.21 adopted to be effective September 1, 1998, 22 TexReg 7647. Subchapter B. Middle School; interpreted by Jane M. Packard, Ph.D.
  - Workbook TEKS Correlation
- Microsoft Excel calls this a Workbook, because it has several worksheets.

Inquiry-based learning



Organization

- 3 Circles of worksheets
  - 1st circle elementary
  - 2nd circle middle school
  - 3rd circle high school
- Circle of Science
  - Observation
  - Ask Questions
  - Measurements
  - Answer Questions
- Workbook

...lifelong inspiration

Middle School Ecology Lesson

Lets look at our wolves

What happens when there are limited deer and not enough to feed this pack of wolves and cougars? They are both struggling to survive…

Competition

In this clip the wolf is the…..and the deer is the…..

Predator….Prey

Discover how wolves live together in families!

Answering basic questions

What is this area with all the trees known as? Think about your chapter 1 vocabulary!

Forest = Ecosystem

What is a wolf?

Canis lupus

The gray wolf is one particular kind of organism, they are all similar which means they are all part of the same…..

Species!

- 32 Subspecies e.g.
  - arctic
  - gray or "timber"
  - Rocky Mountain
  - Mexican
- Carnivore
  - Males: 65-85 lbs
  - Females: 55-70 lbs
- ancestor of domestic dogs

Where would we go to watch wolves?

- National Parks
  - Yellowstone
  - Denali
  - (Isle Royale)
- Wolf Centers
  - International Wolf Center, Minn.
  - Wolf Park, Ind.
- Zoos

Picture eagles, fish, deer, rabbits and other forest creatures above. These animals all living in a common area together are a …….

Community

…lifelong inspiration

How are these scientists determining population?

Direct Observation

What are some other methods to determine the population of wolves?

Indirect observation, sampling, mark and recapture studies

Recommendations

- Resources for background knowledge
  - Chapter on wolf behavior
  - Detailed description of the structure and function of the wolf workbook
- Supplemental Materials
- Marketing
- Adoption and PD in school curriculum

Continued Development

- Flexibility
- Teachers guide
- Workbooks for other species
- Integration of additional science text

Conclusion

- Successful implementation of the Wolf Workbook into the classroom
- Acceptance by in-service teachers
- Inquiry connection is accomplished through PD and supportive materials