

Grant Proposal

Abstract or Project Summary:

This project focuses on the real world problem, “What can our community do to minimize the damage done by humans in and around Lake Lavon?” Students will use scientific tools and processes to learn content suggested by local, state, and national standards by going into the field, collecting data and samples, performing labs and creating content based presentations and reports to demonstrate knowledge learned.

Introduction:

My name is Tanja Smith, and I am a eighth grade science teacher at McMillan Junior High in Wylie, Texas. My middle school is in the Wylie Independent School District. I am requesting that the National Wildlife Fund provide funding for an ecology and biodiversity project for my students that directly involves students in discovering the careful balance of life at our local lake, Lake Lavon. Our common goal, to encourage student environmental awareness and stewardship and help students and teachers develop stronger relationships within our community¹ is exactly what I hope to develop in this lesson. This project provides students with a true scientific field project, using scientific techniques and tools that will provide them with a unique and authentic investigation. While giving them this real world application of concepts learned in the classroom, this unit also gives the students of Wylie ownership of the responsibility to contribute their efforts to keep the Lake Lavon park environment healthy and promote the minimization of human impact. The project is developed as a project-based instruction (PBI) lesson. This teaching approach has been known to establish connections to prior learning as well as scaffolding for future content by the Buck Institute².

Problem Statement:

Students will learn about biodiversity within the ecosystem of the lake, and how humans have contributed to change in that environment. Development of a sense of stewardship in maintaining the careful balance of biotic and abiotic factors will be encouraged throughout the lessons contained in this three week project. Students will examine how humans may have influenced changes and discover how small things, like picking up trash and being careful about chemical disposal (like oil), can make a huge difference to organisms living at the lake. The project focuses specifically on the following state standards:

Texas Essential Knowledge and Skills (TEKS), §112.19. Science, Grade 7, Beginning with School Year 2010-2011.

(2) Scientific investigation and reasoning. The student uses scientific inquiry methods during laboratory and field investigations. The student is expected to:

- (A) plan and implement comparative and descriptive investigations by making observations, asking well-defined questions, and using appropriate equipment and technology;
- (B) design and implement experimental investigations by making observations, asking well-defined questions, formulating testable hypotheses, and using appropriate equipment and technology;
- (C) collect and record data using the International System of Units (SI) and qualitative means such as labeled drawings, writing, and graphic organizers;
- (D) construct tables and graphs, using repeated trials and means, to organize data and identify patterns; and
- (E) analyze data to formulate reasonable explanations, communicate valid conclusions supported by the data, and predict trends.

(10) Organisms and environments. The student knows that there is a relationship between organisms and the environment. The student is expected to:

- (A) observe and describe how different environments, including microhabitats in schoolyards and biomes, support different varieties of organisms;
- (B) describe how biodiversity contributes to the sustainability of an ecosystem.

(5) Matter and energy. The student knows that interactions occur between matter and energy. The student is expected to:

- (A) recognize that radiant energy from the Sun is transformed into chemical energy through the process of photosynthesis;
- (B) demonstrate and explain the cycling of matter within living systems such as in the decay of biomass in a compost bin; and
- (C) diagram the flow of energy through living systems, including food chains, food webs, and energy pyramids.

Objectives and Activities:

Objectives and activities for this field investigation will provide students with various experiences through which content will be learned. These experiences will create scaffolding for future learning by connecting these meaningful activities with prior learning from the classroom.

Upon completion of this project:

1. Students will use scientific inquiry methods during laboratory and field investigations.
 - Students will plan, design, formulating testable hypotheses, implement investigations, collect and record data, construct graphs and tables, analyze, and communicate data and predict trends.
 - Throughout this unit, students will have opportunities to perform these activities with their computer research, field data, and classroom workshops/
 - Students will ask well-defined questions.
 - Development of critical thinking skills and inquiry will be encouraged by the variety of activities used to cement content with prior learning and novel experiences incorporated into the unit.
2. Know there is a relationship between organisms and the environment.
 - Students will observe and describe how the lake environment supports different varieties of organisms;
 - This particular objective can be met and measured specifically during field inquiry and reporting in their notebooks and reports.
 - Students will describe how biodiversity contributes to the sustainability of an ecosystem.
 - Through field investigations and student research, students will be able to follow a reasonable food web providing explanations of how any one particular organisms absence or presence affects other organisms in that web.
3. Students will know interactions occur between matter and energy.
 - Students will be able to show how energy and matter flows through a system in their reports.
4. Students will know that energy from the Sun is transformed into chemical energy through the process of photosynthesis.
 - Students will demonstrate and explain the cycling of matter.
 - This content will be discussed in student reports.
 - Students will diagram the flow of energy through living systems.
 - This content will be discussed in student reports.

Timeline of events:

PROJECT CALENDAR				
Project: Lake Lavon Alive!			Time Frame: 3 weeks	
MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
PROJECT WEEK ONE				
Notes: Introduction of project, field skills, field trip, testing				
Entry Document (Request for Information)	Talk about issues brought up by previous days exit	Return papers. Discuss results.	Return papers. Discuss results.	Return papers.
Generate Know & Need to Know list (<i>on Google docs for student ease of access.</i>)	Revisit Know / Need to Knows.	Revisit Know / Need to Knows.	Discuss events of the field trip.	Discuss findings from the microscope lab and the water testing lab.
Provide list of helpful websites	Discuss research from Day 1.	Field Trip to Lake Lavon. (Full Day)	Run through findings from the field notes.	Compare group findings with water testing and compare locations.
Provide social contracts that include guidelines and consequences.	Workshop: Acquiring Field Skills	Students take notes as Parks department personnel talk about the wildlife and special needs of the lake community in the field.	Examine contents of lake water under microscope.	Soil testing lab.
Provide rubrics for final products: report, presentation, including 21 st century skills.	(Carolina Biological – Ecology Field Kits)	(Carolina Biological – Ecology Field Kits)	Sketch findings and attempt identification of organisms.	(Carolina Biological – Rapitest Soil Test Kit)

Pick up signed contracts.	In class practice using a scavenger hunt.	Review field experience checklists so students can stay on task.	Water testing lab.	Exit ticket: Completed water and soil labs.
Allow groups to self-assign topic choices	Exit ticket: Turn in completed scavenger hunt exercise.	Collect water and soil samples.	(Carolina Biological – Water Quality Test Kit)	
Students will brain storm ways to conduct research.		Map locations where samples were taken.	Exit ticket: Completed microscope lab and water test results.	
Conduct initial computer research		Take pictures and make drawings of the area.		
Assist students by posing questions, keeping students on task, and providing support where necessary.		Turn in all samples along with field experience checklists and field notes.		
Exit ticket: 3 x 5 card with 3 relevant questions about project.				

PROJECT WEEK TWO				
MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
Notes: Workshops, field trip, testing, discussions				
Summative assessment: Quiz: Water lab	Summative assessment: Quiz: Soil lab	Discuss questions about previous day.	Return papers.	Return papers.
Return papers	Discuss questions about previous day.	Revisit Know / Need to Knows.	Revisit Know / Need to Knows.	Group discussions: Work on projects: computer research, putting results from labs together, begin assembling projects.
Revisit Know / Need to Knows.	Whole class workshop: What organisms are in the lake community and how do changes in water level and contaminant load affect those populations?	Field Trip (Half day)	Discuss events of the field trip.	Whole class discussion: review rubrics, review data, review concepts.
Whole class workshop: How do contaminants get in the lake?	Exit ticket: 3 x 5 card with 3 relevant questions about workshop.	Collect water and soil samples.	Run through findings from the field notes.	Workday: By end of day should have rough data graphs and charts

Exit ticket: 3 x 5 card with 3 relevant questions about workshop.		Use map locations where samples were taken during the first field trip.	Water testing lab.	If time remaining, use this time for further computer research or planning final product.
		Take pictures and make drawings of the area.	(Carolina Biological – Water Quality Test Kit)	Reminder>>> Reports due in 7 days!
		Take samples of vegetation, insects, and trash found.	Soil testing lab.	
		Turn in all samples along with field experience checklists and field notes.	(Carolina Biological – Rapitest Soil Test Kit)	
			Exit ticket: Completed comparative water and soil labs.	
		Take samples of vegetation, insects, and trash found.		
		Turn in all samples along with field experience checklists and field notes.		

PROJECT WEEK THREE				
MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
Notes: Workdays, Presentations, Unit Exam				
Progress checks.	Return outlines, graphs and charts with feedback. Discuss results.	Progress checks.	Peer review: Groups present findings to the whole class for practice. Students will fill out a peer review form.	Presentations:
Revisit Know / Need to Knows.	Progress checks.	Workday: By end of day will have final product complete and complete at least one presentation rehearsal.	The teacher will provide written feedback for individual groups.”	Wylie Mayor, City Council members, Parks department representatives, and community leaders panel to jury the projects in the classroom.
Address any questions to clear list or redirect students to where they can find the answers on their own.	Workday: Work on final projects.	Submit rough draft of report in class.	Submit presentations electronically by 9 pm.	Discussions to close project. Kudos!
Workday: By end of day should have data graphs and charts to be incorporated into presentation, presentation outlines.	Small group workshop: Interpreting results.			Submit reports electronically by 9 pm..

Small group workshop: Graphing with Excel.	.Formative assessment: check each groups work for progress. Should have most of the project complete.			
Exit ticket: Completed graphs and data charts, and presentation outline.				

Evaluation:

A variety of assessments will be used to document each student's progress:

Artifact	Assessment
Copy of K/NTKs, social contract, and 3 x 5 card with 3 relevant questions about project.	Formative assessment: Looking for prior knowledge and thought process of what students think they need to know. Three relevant questions should reflect some initial research, any unclear items from the entry doc, and/or project specifics.
Scavenger hunt exercise.	Formative assessment: Key point is the ability to apply field skills in the lab before using them in the field. This is a preparation to be more efficient during the field trip.
Field experience checklists to be answered on field trip and all field notes.	Formative assessment: Ensure students are focusing on important issues in ecology, such as, "why is this part of the lake so oily?"
Microscope lab and water test results.	Formative assessment: Check for understanding of presence of different types of organisms and chemicals in lake water.
Completed water and soil labs.	Formative assessment: Check to see that students have an understanding about results.
Water lab quiz.	Summative assessment: Check for misconceptions about water quality.

3 x 5 card with 3 relevant questions about workshop/project.	Formative assessment: Check for understanding and misconceptions.
Soil lab quiz.	Summative assessment: Check for misconceptions about soil quality.
Group and whole class discussions.	Formative assessment: These assessments are to check for understanding and to clear any misconceptions about content.
Completed comparative water and soil labs.	Formative assessment: Check for correlations between first and second field trip results.
Progress checks.	Formative assessment: See if students are on the right track, make adjustments, make suggestions, encourage creativity, and clear misconceptions. Make note of any major issues and address them in a workshop or class discussion.
Graphs and data charts.	Formative assessment: Check to see if anyone is having problems with software use and/or having problems graphing.
Presentation outline.	Formative assessment: Check to see if any content components are missing.
Rough draft of report.	Formative assessment: Opportunity to provide students with feedback to make their reports and presentations better.
Peer Review.	21st Century Skill, assessed on Presentation Rubric.
Presentation.	Summative assessment: See Rubric.
Unit Report.	Summative assessment: See Rubric.

The assessments for the final projects will be evaluated according to the following rubrics:

Report Rubric				
Criteria	3	2	1	0
Rough Draft	Submitted on time, basic argument is easy to determine. Cites at least one source.	Submitted on time, basic argument present, but may be unclear. Cites at least one source.	Submitted on time, basic argument not present or totally unclear. Does not cite any sources.	Not submitted.
Content	Accurately explains all seven content mastery concepts: 1. relationship between organisms and the environment; 2. describe how biodiversity contributes to the sustainability of an ecosystem; 3. analyze data to formulate reasonable explanations, communicate valid conclusions supported by the data, and predict trends; 4. cycling of matter within living systems; 5. flow of energy through living systems; 6. graphs of data and data charts; and, 7. includes suggestions for mitigation that are reasonable.	Explains up to five content mastery concepts accurately.	Explains up to three content mastery concepts accurately.	Does not explain any of the information required for a accurately.
Format	Meets length requirements, no formatting errors, and has no grammatical/spelling errors.	Meets length requirement. Few spelling or grammar errors, which may detract from the argument.	Meets length requirement. Many spelling or grammar errors which detract from the effectiveness of the argument.	Does not meet length requirement, large amount of spelling, grammar, and/or formatting errors which make the paper unreadable.

Presentation Rubric			
Criteria	2	1	0
Content	Shows a full understanding of the topic. Explains how humans impact the lake environment and provides suggestions for minimizing effects on the ecosystem.	Shows a partial understanding of the topic. Explains the concepts but fails to provide reasonable mitigation suggestions.	Does not seem to understand the topic very well. Does not present factual information.
Organization	Presentation is well organized. Organization enhances the content.	Presentation is organized.	Organization detracts from information presented.
Delivery	Presentation appears well rehearsed. Consistently maintains good eye contact, and uses appropriate volume, pitch, and vocabulary to convey information.	Presentation appears rehearsed. Sometimes maintains good eye contact, and uses appropriate volume, pitch, and vocabulary to convey information.	Does not appear to have rehearsed, poor or no eye contact, fails to use appropriate volume, pitch, and vocabulary to convey information.
Visual Aids	Visual aids support the information presented.	Visual aids not used, or offer minimal support for ideas presented.	Visual aids actively distract from the information presented.
Peer Review (21 st Century Skill)r	Student completed peer review on all other presenting groups.	Student completed peer review on some of the other presenting groups.	Student did not complete peer review on any other presenting groups.

Budget:

This budget was developed to provide students with the tools necessary for completion of this project. For eighty students (four classes, each with twenty students), sixteen groups of five students each will work together on the field investigations, collecting samples in the field, gathering data, and developing presentations. Students will be using all materials for this purpose. Using real scientific equipment that would otherwise be unavailable to them is unique, creates a sense of reality that they could do this sort of thing as a career in the future and create a new spark of creative inquiry leading to students' personal research and investigation outside of the classroom and outside of the school. The school district will provide transportation and security to and from Lake Lavon for both days in the field. McMillan Junior High's Parent Teacher Association will provide parent volunteers to help manage students. An aide to assist any students with challenges will be provided by the district.

From Carolina Biological					
Item	Purpose	Item Number	Quantity	Price	Item Total
Ecology Field Kit	Provides students with the tools necessary for collection of specimens.	652000	16	\$ 999.95	\$ 15,999.20
Water Quality Test Kit	Contains chemicals for students to run Water quality tests.	652712	16	\$ 44.25	\$ 708.00
Rapitest Soil Test Kit	Contains chemicals for students to run Soil tests.	665404A	16	\$ 21.50	\$ 344.00
Rapitest Soil Test Replacement Kit	Replacement chemicals for students to run their own tests.	665404	8	\$ 14.25	\$ 114.00
Nitrile Disposable Gloves, Small, Box 100	Necessary for field work and safety.	706335	4	\$ 17.95	\$ 71.80
Nitrile Disposable Gloves, Medium, Box 100	Necessary for field work and safety.	706336	4	\$ 17.95	\$ 71.80
Nitrile Disposable Gloves, Large, Box 100	Necessary for field work and safety.	706337	4	\$ 17.95	\$ 71.80
Deluxe OSHA-Compliant First Aid Kit	Necessary for field work and safety.	646514	1	\$ 56.20	\$ 56.20
Walter LTM Series Compound Microscope	Class set of microscopes necessary for students to view organisms in lake water.	593007	15	\$ 359.00	\$ 5,385.00
Microscope Slides, Student-Grade, Frosted, Single End, Box	Necessary for students to prepare samples for viewing.	632956	3	\$ 10.15	\$ 30.45
Coverslips, Student-Quality, Glass, 18 x 18 mm, Box 100	Necessary for students to prepare samples for viewing.	632960	3	\$ 3.95	\$ 11.85
From Office Depot					
Office Depot Brand Marble Quad Composition Book, Quadrille Ruled	experiences, notes, drawings, data charts, graphs, questions, and research all in one project notebook per student.	320155	80	\$ 2.99	\$ 239.20
Grand Total					\$ 23,103.30

My goal for my students is to gain insight into the problems of human impact on an ecosystem and take responsibility to minimize that impact. Tying this project to our local Lake Lavon environment has the potential to change not only our school's perception of our place in our local city, but as global stewards of our limited and precious resources that is offered though our diverse lake populations. These are skills and ideals that will

carry these children into adulthood and parenthood to be passed on to the next generation. Please help us make a difference in our global community and here at home.

CV (Curriculum Vitae) for Tanja Smith

TEACHING EXPERIENCES

Spring 2013 Berkner High School STEM Academy - Richardson, TX, - My fourth student teaching assignment was with Ms. Martin's senior Engineering class. My partner and I taught a three day project based instruction lesson on bioengineering a bionic eye for a pirate.

Fall 2011 Berkner High School - Richardson, TX, - My third student teaching assignment was with Ms. John's ninth grade Biology class. My partner and I taught lessons on the animal immune defense systems and flow of matter and energy.

Spring 2011 Richardson North Junior High - Richardson, TX. - My second student teaching assignment was with Ms. seventh grade Biology class. This is the class that really made me excited to teach. My partner and I taught lessons about behavioral adaptations, genetic adaptations, and homeostasis.

Fall 2010 Yale Elementary - Richardson, TX. - My first student teaching assignment was with Ms. fifth grade science class. This was a wonderful experience where my partner and I taught the students about weathering, food chains, and animal resources.

VOLUNTEER TEACHING EXPERIENCES

Throughout my pursuit of a degree from UT Dallas, I have been involved with different organizations to teach young people. Hands-on inquiry workshops through various events held by Earth Day Dallas, Sally Ride Festival, WIP Physics Camps for Girls, Girl Scouts, WeTeach, and Women in Science Alliance have all afforded me some great one-on-one time teaching students of all abilities and backgrounds about the exciting field of science. These opportunities have not only enriched my education at UT Dallas, but made an impact of our community.

Appendix:

³Ecology Field Kit:



Ecology Field Kit includes:

- Bottom-Sampling Dredge
- Sounding Lead and Calibrated Line
- 3-gal Collecting Bucket
- 5-gal Collecting Bucket
- Collecting Tray and Equipment
- Dip Net
- Forel-Ule Color Scale
- Plankton Net
- Sand/Mud Sieve
- Secchi Disk
- 4 x 20" Seine
- Water-Sampling Bottle
- Water Thermometer

³Water Quality Test Kit:



Water Quality Test Kit includes the following tests:

- 2 Iron
- 2 Copper
- 2 Chloride
- 2 Nitrate/Nitrate Nitrogen
- 2 Total Chlorine
- 2 Free Chlorine
- 2 Total Hardness
- 2 Sulfate
- 2 pH
- 2 Total Alkalinity
- 2 Hydrogen Sulfide
- 1 Pesticide
- 1 Lead
- 1 Bacteria

³Rapitest Soil Test Replacement Kit:
Image is unavailable.

RapiTest Soil Test Replacement Kit contains materials for 40 tests: 10 tests each for pH, nitrogen, phosphorus, and potash.

³Rapitest Soil Test Kit:



RapiTest Soil Test Kit contains materials for 40 tests: 10 tests each for pH, nitrogen, phosphorus, and potash. Instructions included.

³Nitrile Disposable Gloves:



100% nitrile gloves contain no natural rubber proteins—the ideal solution for individuals allergic to natural rubber latex. Ambidextrous, beaded cuff, 5- to 6-mil thickness. Powder-free.

⁴Office Depot® Brand Marble Quad Composition Book, 7 1/2" x 9 3/4", Quadrille Ruled, 100 Sheets, Black/White



Features a class program on the inside front cover and mathematical information on the inside back cover. A durable, high-quality back-to-school journal! Quad-ruled white paper. Durable books are thread sewn and tape bound.

³Deluxe OSHA-Compliant First Aid Kit:



A 196-piece comprehensive first aid kit designed for a group of 50 people. Contains 20 important first aid products, including top-quality bandages, gauze pads, compresses, eye care products, ointment, wipes, tape, scissors, tweezers, and a 6-piece CPR pack. Packaged in a durable transport case that can be easily wall-mounted in the classroom or carried along on field trips. Kit exceeds federal OSHA requirement 1910.151 and is endorsed by the American Medical Association.

³Microscope Slides, Student-Grade, Frosted, Single End, Box 72



A good quality, economical microscope slide made of clear, noncorrosive glass with ground edges. Frosted, Single End. Size, 3 x 1"; thickness, 1.0 to 1.2 mm. These slides have not been precleaned. Packaged in boxes of 72 slides.

³Coverslips, Student-Quality, Glass, 18 x 18 mm, Box 100



Made of noncorrosive glass in 2 of our most popular sizes. Packaged in boxes of 100.

³Walter LTM Series Compound Microscope:

Grade 9-College. The LTM, used in science classrooms throughout North America, is an outstanding value for a full-featured inclined microscope that meets the higher magnification requirements for advanced high school or entry-level college biology. This instrument offers a 4-position reverse nosepiece with high-resolution 4x, 10x, 40xr, and 100xr (oil immersion) color-coded DIN** objectives for excellent image quality; ruggedly constructed base to avoid tipping over and coated to stand up to acid and chemical reagents; and bright, cool, and efficient LED illumination with light intensity control that is perfect for viewing living specimens. Limited lifetime warranty.

360° rotating head inclined at 45° for easier viewing

Locked-on 10x widefield eyepiece with calibrated pointer for measurement

Achromatic DIN objectives, parcenter and parfocal, for easier focusing**

Built-in mechanical stage for easier slide scanning

Separate coarse and fine focus with rack-and-pinion mechanisms that have positive stops at both ends of the stage travel to prevent damage to delicate specimens or optics

Rack-and-pinion adjustable 1.25 N.A. Abbe condenser and iris diaphragm for increased control of light and image contrast

Built-in illumination system in base with on/off switch

Bright, cool LED illumination with light intensity control

10,000-hour LED bulb life

Cord holder for convenient storage

Comes complete with dust cover and instruction manual

Size, 11-1/2" H x 6" W x 9-1/2" D; weight, 10 lbs.

References

¹National Wildlife Foundation: <http://www.nwf.org/Eco-Schools-USA/Become-an-Eco-School/Pathways/Biodiversity.aspx>

²Buck Institute: <http://www.bie.org/>

³Carolina Biological:

⁴Office Depot