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Is Project Based Learning a More Effective Way of Teaching Than Traditional Teaching?

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Abstract

It can be difficult to find effective teaching techniques that keeps students engaged and promote higher order thinking skills continuously throughout your content instruction. The purpose of this research was to discover if project base learning is a more effective instruction framework versus our traditional framework of instruction, which involves teachers standing in front of students and providing information through a lecture. Participants included two sections of fourth grade classrooms. The controlled group consisted of 20 students and the experienced groups consisted of 19 students. The controlled group demonstrated a significant amount of student's engagement throughout the entire unit. In contrast, the experienced group was not as high in their level of engagement as the controlled group, but did have three days of 100% engagement when the teacher provided students with hands-on activities. These findings suggest that whether you are teaching with a project based learning framework or traditional teaching, if you have students who have a high interest in the topic and are allowed to design, create, or use their hands will be more engaged in their learning.

Is Project Based Learning a More Effective Way of Teaching Than Traditional Teaching?

We know as educators we want to make sure our students are productive citizens in our ever changing world. Many of us have this wording in our district mission statement. Today's K-12 students need to build their own problem-solving skills and thinking ability while learning the content necessary to apply those skills. The framework of instruction that has been proven to work well with all students with mixed abilities can pool their talents collaboratively to invent a solution is project based learning (Delisle,1997). It is the job of teachers and administration to make sure that our students are able to think critically and solve problems, work well with others, and manage themselves effectively. Preparing students for a project-based world means recognizing Project Based Learning (PBL) as an approach that motivates students who may be disengaged or good at playing the school game. In turn, the PBL approach can create a generation of students who are ignited by meaningful, authentic and often real-world learning, activating interests that guide them toward success in college and career, and helping to ensure deeper learning outcomes (Lathram, Lenz, Ark, 2016). These characteristics are a critical part of Gold Standard PBL. Gold Standard PBL teaches students the important content standards, concepts, and in-depth understandings that are fundamental to school subject areas and academic disciplines. In good projects, students learn how to apply knowledge to the real world, and use it to solve problems, answer complex questions, and create high-quality product (Buck Institute for Education, 2015). Project Based Learning is a teaching method in which students gain knowledge and skills by working for an extended period of time to investigate and respond to an engaging and complex question, problem, or challenge. PBL's consist of essential project design elements such as:

- **Key Knowledge, Understanding, and Success Skills** - The project is focused on student learning goals, including standards-based content and skills such as critical thinking/problem solving, collaboration, and self-management.
- **Challenging Problem or Question** - The project is framed by a meaningful problem to solve or a question to answer, at the appropriate level of challenge.
- **Sustained Inquiry** - Students engage in a rigorous, extended process of asking questions, finding resources, and applying information.
- **Authenticity** - The project features real-world context, tasks and tools, quality standards, or impact – or speaks to students' personal concerns, interests, and issues in their lives.
- **Student Voice & Choice** - Students make some decisions about the project, including how they work and what they create.
- **Reflection** - Students and teachers reflect on learning, the effectiveness of their inquiry and project activities, the quality of student work, obstacles and how to overcome them.
- **Critique & Revision** - Students give, receive, and use feedback to improve their process and products.
- **Public Product** - Students make their project work public by explaining, displaying and/or presenting it to people beyond the classroom (Larmer, 2015).

Buck Institute's Gold Standard PBL design elements differentiate a project from an activity. PBL is sustained learning that requires of students a high degree of challenge. Projects should be demanding and require a public audience to showcase work. PBL create an authentic learning experience for students (Lathram, Lenz, & VanderArk, 2016).

Hypothesis

After a preliminary review of recent literature related to project based learning to use as an instructional framework, it is likely that students who are instructed with this intervention have an increase in engagement because they can direct their own activities, have greater responsibilities in their learning, opportunities for challenge and stretching their learning and to learn on their own. Therefore, the question is should project based learning become more accepted as a justification for student engagement within a unit of study.

Variables

The independent variable in this project will be the PBL classroom or traditional teaching. The dependent variable will be the student's engagement.

Methodology

Participants

Okoboji Community School District, located in Milford, Iowa, enrolls 920 students in grades 1st through 12th, Okoboji Elementary houses approximately 450 of those student preschool to fourth grade. Okoboji Elementary School is the 128th largest public school in Iowa. It has 15.9 students to every teacher. They employ 29.93 full time teachers. Okoboji enrollment rank nationally is 23,808th out of 56,229. Enrollment rank in Iowa is 128th out of 723. Out of 715 ranked schools in Iowa, Okoboji Elementary School is ranked 254th for total students on lunch assistance. The percentage of Okoboji Elementary School students on free and reduced lunch assistance (31.7%) is lower than the state average of 43.8%. This may indicate that the area has a lower level of poverty than the state average. Students at a participating school may purchase a meal through the National School Lunch Program. Participants in this research were students who are in our 2016-17 fourth grade classroom. Currently, the fourth grade is departmentalized and two

out of our four sections teach science and the other two sections teach math. The controlled group (traditional) consists of 19 students. One student has been identified in special education services in the area of reading. One student has been identified in the talented and gifted program in the area of math. There are twelve boys and seven girls in this classroom. The experimental group (PBL) consist of 20 students. There are four students who have been identified in special education services in the area of reading. One student is identified in the talented and gifted program for reading and one student for math. There are nine boys and eleven girls in this classroom.

Table 1

Implementation Timeline

Action Steps	Timeline
Present proposal to administration	Day 1
Present proposal to teacher of the classroom where research will be conducted	Day 2
Create and implement PBL	Complete during week 1 and 2
Collect data on student engagement during a traditional instruction	Ongoing weeks 3 and 4
Collect data on result of an assessment on a traditional test after a traditional approach of instruction	Final week of unit (week 5)
Collect data on student engagement during a PBL instruction	Ongoing weeks 3 and 4
Collect data on results of an assessment (project) on PBL instruction	Final week of the unit (week 5)
Review data	Week 5 and 6

Table 1 reflects the timeline which is an estimate of how long each step will take. This research will take up to six weeks of research of data collection, approximately four weeks with traditional approach and project based learning approach, implemented with a controlled group

(traditional) and experience group (PBL). It is important to provide enough time to allow the students to complete their investigations and produce an authentic piece about new learning. Many times it is up to the students to determine how a project based learning will go. The purpose is to prove that students are more engaged, motivated, and have a deeper understanding of skills when they are taught through a project based learning approach.

Data Collection

Quantitative data was used to determine the level of ability amongst the peers within the classroom. Measurement instruments used to collect this information are test scores from traditional unit assessments and test scores from the PBL. Quantitative data will also be used to determine the level of engagement within the classroom. Information from Schlecty's Level of Engagement will be used. This will involve the students placing a popsicle stick into the appropriate cup that represents their level of engagement. This type of data will be collected ongoing through the both approaches. Qualitative and quantitative data will both be collected on journals and artifacts, student surveys, and test scores. A review of the students journaling through the traditional and project based learning way of teaching. Tracking of how the students investigate their question or problem and see if they were able to create a solution to the problem through their journaling or artifacts. A rubric was created to score their work. Data will be collected continuously through this research. The survey will be given to students at the end of the unit to determine how well the students understood the tasks, if they learned more through investigations, and if they would like to learn this way again. This will be given to both classroom styles. Teaching strategies and the curriculum organization differed, but the content was identical. The teachers in each classroom used and scored a common instrument to assess content achievement.

Data Analysis

Mixed strategies will be used to analyze data. Data will be collected from student's survey after the instruction was completed. Data taken will be compared to the traditional approach to the project based learning approach, indicating the possible variables that influence the research. When looking at student engagement and have them filling out a type of reflection and produces a number you can take that information as a percentage, which will provide you some type of quantitative data, but can also be qualitative data.

Results

This research was conducted during our science unit of rocks and erosion with two sections of our fourth grade classrooms. The PBL students were assigned to research the essential question, How can we prevent erosion along our shoreline? They had to create a project to provide awareness to the community on ways to prevent erosion. Students in the traditional classroom were presented with the content and were given few opportunities to bring their learning to life. We needed to measure the level of engagement in each setting the teachers used Schlechty Center on Engagement, which focuses attention on student motivation and the strategies needed to increase the prospect that schools and teachers will be positioned to increase the presence of engaging tasks and activities in the routine life of the school. Schlechty Center on Engagement is the basis of the Working on the Work framework. The students reflected on three levels of engagement retreatism, compliance, and engagement. Retreatism is when the student is disengaged from current classroom activities and goals, thinking about other things or is emotionally withdrawn from the action, rejects both the official goals and the official means of achieving the goals. The student feels unable to do what is being asked or is uncertain about what is being asked and sees little that is relevant to life in the academic work. Compliance is

the official reason for the work is not the reason the student does the work, they substitute their own goals for the goals of the work. They substitute their own goals for the goals of the work. The substituted goals are instrumental for example, grades, class rank, college acceptance, and parental approval. The focus is on what it takes to get the desired personal outcome rather than on the nature of the task itself and satisfactions are extrinsic. If the task doesn't promise to meet the extrinsic goal, the student will abandon it. Engagement is when the student sees the activity as personally meaningful. The student's level of interest is sufficiently high that they persist in the face of difficulty. They find the task sufficiently challenging and believe they will accomplish something of worth by doing it. The student's emphasis is on optimum performance and on "getting it right" (Schlechty Center).

Table 2

Levels of Engagement

	Controlled Group Traditional Instruction	Experienced Group PBL Instruction
Retreatism	7%	2%
Compliance	24%	11%
Engagement	44%	82%

Table two represents that the students who participated in the PBL on the rock unit were much more engaged through the 19 days of instruction, than the students who were taught with a more traditional approach. The controlled group did however, have three days with all students indicated that they were 100% engaged. When looking at the instruction for the day, it was a day where students were providing hands on instruction during their lesson. From day one the PBL classroom was engaged, the hook to the unit was a video from a park ranger from the Badlands explaining the

different layers of the earth and how the land around them has and continues to change. The students were always questioning ideas that were presented to them. We then had an opportunity to hear a concern from a local businessman who created a driving questions and showed the concerns he has of erosion around the lakes area. He sent a letter to our classroom and this inspired our students to solve his problem. The data dropped in the PBL setting when the students did not have a clear understanding of finding ways to prevent erosion. Many students were actively searching for what erosion was, so the teacher pulled the student's together from their research to present a mini lesson on prevention and ways we can solve the driving question.

Table 3

Assessment Results

	Controlled Group Traditional Instruction	Experienced Group PBL Instruction
Common Assessment	78%	82.5%

The Assessment Results from Table 3 indicate that the experienced group scored 82.5% as a class average on the end of the unit assessment, compared to the controlled group averaging 78% on their end of the unit assessment. These score reflect that the students from the experienced group had a good understand of the skills that were taught during the unit. The experienced group overall has a much lower ability level to learn, understand, and apply new learning. This group of students have more students who are identified in special education in academics and behavior. The controlled group has less students who are identified in special education in academics and behavior. When we take a look at a recent end of the unit reading test, the experienced group scored on average 58% and the controlled group scored 65% on average. This is an example of

how powerful project based learning can impact student's learning. When you are providing hands on experiences, students are able to drive their own learning through questions, and are allowed to investigate different solutions students' scores are higher and students are able to retain those skills because they truly understand the concepts. When students are just presented information through lecture they do not demonstrate their knowledge as well on tests. So keep in mind the content information that is presented when you are learning about things in science and social studies that in itself is more engaging than reading stories because in normal circumstances teachers provide those hands on experiences more automatically. As we take a closer look at the Next Generation Science Standards it is only fitting to provide instruction with a project based learning framework because it does allow for students to develop an in-depth understanding of content and develop key skills such as, communication, collaboration, inquiry, problem solving, and flexibility, that will serve them throughout their educational and professional lives.

Table 4
Result of Self Reflection of Learning

	Controlled Group Traditional Instruction	Experienced Group PBL Instruction
 • I understood the task. • I am happy with what I learnt. • I felt I learned more as I investigated/was presented information. • I would like to learn this way again.	37%	75%
 • I am unsure of how much I understood. • I had a difficult time at first with the investigation/unit. • I have more questions. • I need more practice. • Willing to learn this way again.	53%	15%
 • I didn't understand this way of learning. • I needed a lot of help. • I would like to learn the way I am used to. • I do not like learning this way.	11%	10%

Discussion

Overall, this study had positive findings that concluded that project based learning is an effective framework for instruction to enhance student learning. Project-based instruction in the fourth grade classroom had improved content learning, higher levels of engagement and more positive perceptions of the subject matter. With such a clear research base in support of its effectiveness, project-based methods appear to offer the possibility of success both overall and to a broader range of students than traditional lecture-based instruction. PBL is working in schools, for example, New Tech Network or High Tech High, are schools that have shown that deeper learning

environments positively influence students' academic outcomes and social factors. These types of academic settings had a significant positive impact, on average, on students' content knowledge and standardized-test scores (Lathram, Lenz, Ark, 2016). This research also supports their theory, the fourth graders performed better on the end of the unit test, produced authentic products to bring awareness to the community, which deepen their understanding of the content presented. Students need to learn a body of essential knowledge (core information), have the ability to use knowledge effectively with problem situations in and out of school (understanding) and the ability to extend or improve that knowledge and to develop strategies for dealing with future problems (active use of knowledge) (Delisle, 1997). It brings great joy, when you see students excited to share their learning with that authentic audience. We were able to have articles published in the local paper, videos shown on an organization's website, and poster were hung in area business to bring awareness to the public on the content the students were learning in science.

References

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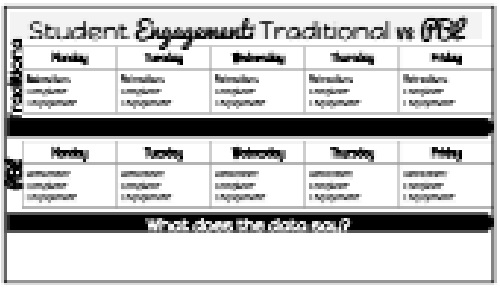
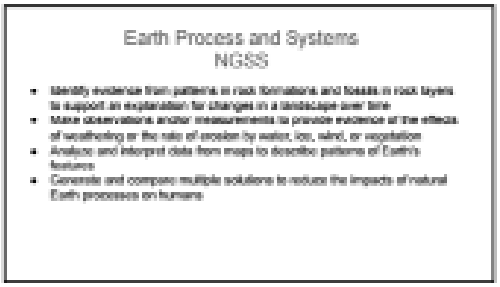
Appendix A

Fourth Grade PBL


ENGAGE-O-METER
COMPLIANT


Student Engagement Traditional vs PBL
Traditional
Monday
Tuesday
Wednesday
Thursday
Friday
PBL
Monday
Tuesday
Wednesday
Thursday
Friday
What does the data say?


Earth Process and Systems
NGSS

Unit Goals:

- Know the three different rock types
- Understand what is erosion, weathering,deposition.
- How does our land change.
- Have a basic understanding of the rock cycle.

VOCABULARY

*Fossils 

*Inland Sea 

*Sediment 

*Butte 

*Environment 

Hook

Visit with Ranger Cindy

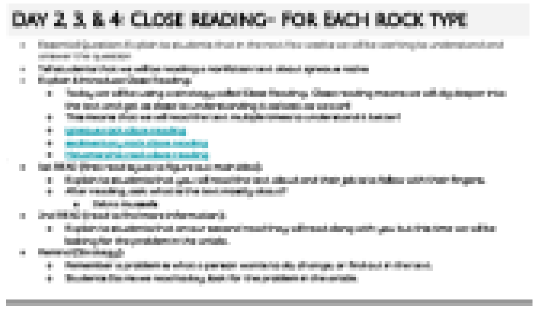
https://www.nps.gov/teachers/classrooms/secrpas.htm

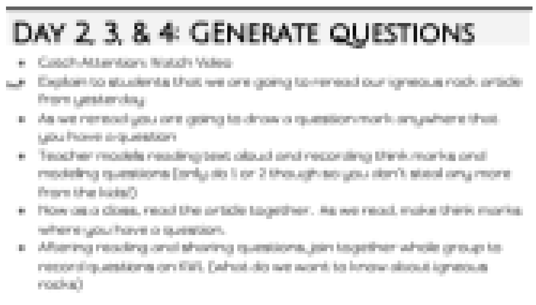
Make a poster of questions they may have from the video.


Pangea
What did our world look like millions of years ago?


Skills from Wonders


IGNEOUS ROCKS


DAY 2, 3, & 4: CLOSE READING- FOR EACH ROCK TYPE


DAY 2, 3, & 4: GENERATE QUESTIONS
Catch Attention: Watch Video
Explain to students that we are going to reread our igneous rock article from yesterday
As we reread you are going to draw a question mark anywhere that you have a question
Teacher models reading text aloud and recording think marks and modeling questions (only do 1 or 2 though so you don't steal any more from the kids!)
Now as a class, read the article together. As we read, make think marks where you have a question.
After reading and sharing questions, join together whole group to record questions on KWL (what do we want to know about igneous rocks)

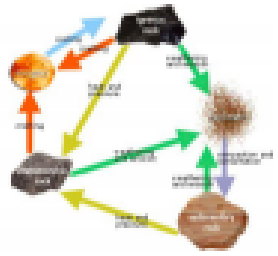

Igneous rocks look like:


SEDIMENTARY ROCKS


Sedimentary rocks look like:

Metamorphic rocks look like:

The Rock Cycle



The Hook

Experiment: liter (3) water bottles (3), yarn, dirt, leaves, grass. We will determine which one has the most erosion.
Student will witness experiment, discuss, and journal

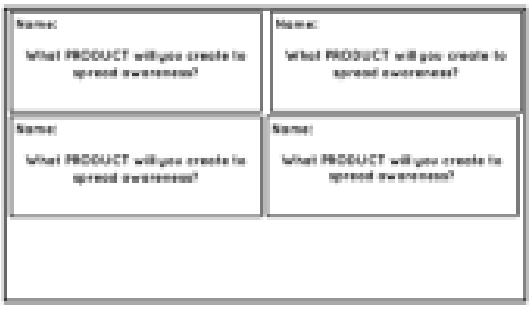
Rock Formations
Caused by Erosion and Weathering

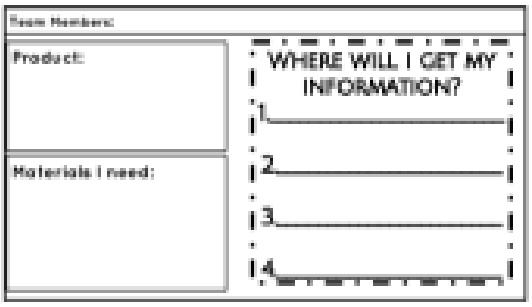
Video: Strange rock formations

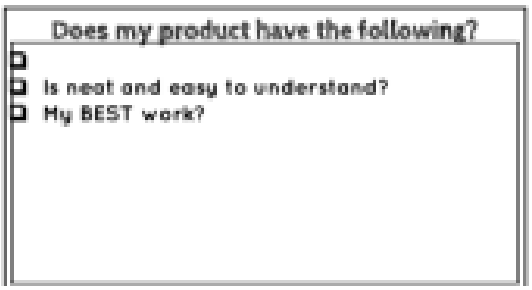
Erosion Power point- Created by Matt Thelen, co-worker's husband who deal with erosion on a daily basis.

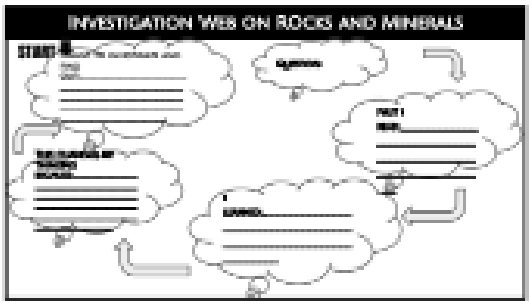
Resources

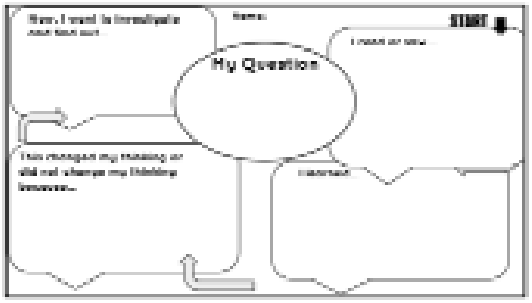
Features of Erosion
Rocks
Badlands
What is going on with our Earth?


Name:
What PRODUCT will you create to spread awareness?
Name:
What PRODUCT will you create to spread awareness?
Name:
What PRODUCT will you create to spread awareness?
Name:
What PRODUCT will you create to spread awareness?


Team Members:
Product:
Materials I need:
WHERE WILL I GET MY INFORMATION?
1.
2.
3.
4.


Does my product have the following?
Is neat and easy to understand?
My BEST work?

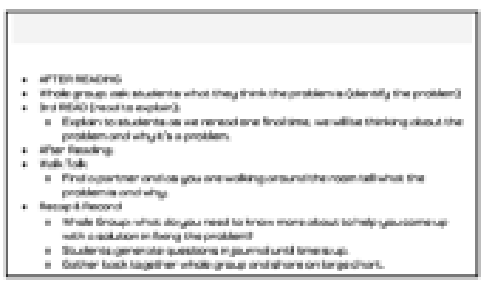

INVESTIGATION WEB ON ROCKS AND MINERALS


My Question

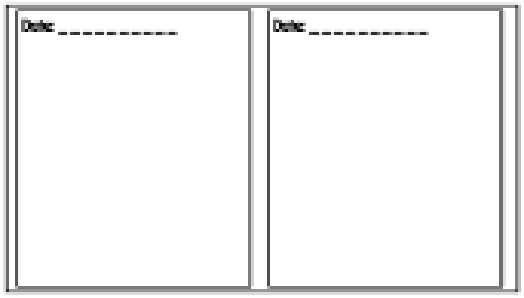

Rocks and Minerals
Comprehension Strategies:
Summarize
Comprehension Skills:
Point of View
Vocab Strategies:
Suffixes
Grammar:
Writing:
Descriptive Details
Sight Words:
Answer, been, body, build, heat, heard,

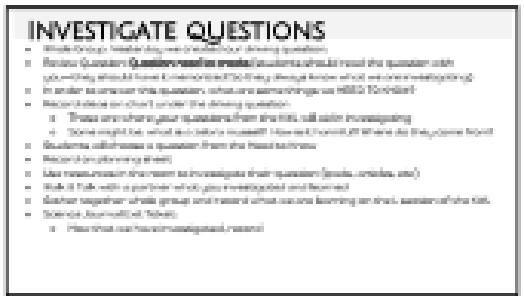

DRIVING QUESTION
How does erosion affect our lakes and lake shore banks?

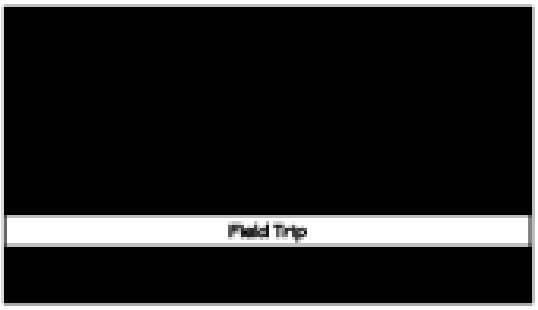

PREVENTION
How does erosion affect our lakes and lake shore banks?
How to control erosion?

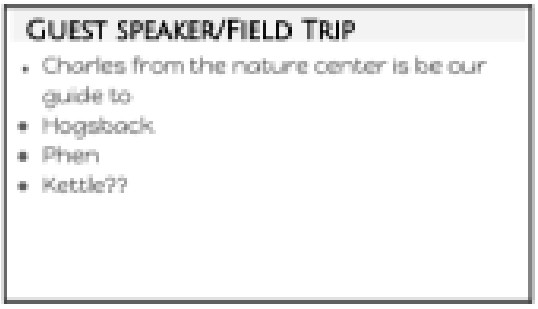



Earth's Changing Land (Rocks)
_____'s
Science Journal
Earth's Changing Land (Rocks)
_____'s
Science Journal


Date: _____
Date: _____

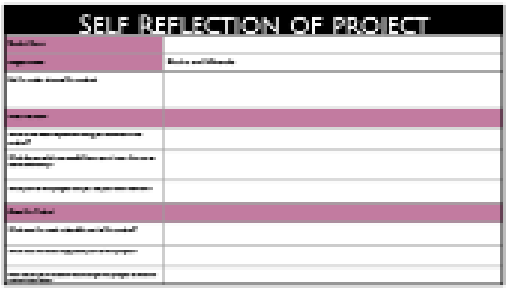

INVESTIGATE QUESTIONS

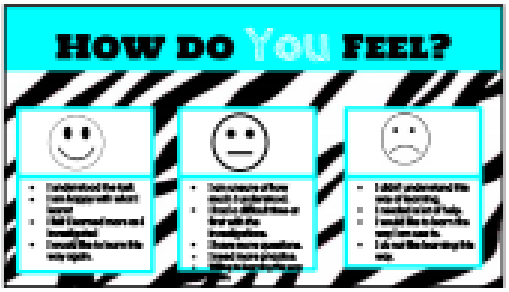

Field Trip


GUEST SPEAKER/FIELD TRIP
Charles from the nature center is be our guide to
Hogsback
Phen
Kettle??


Spread Awareness/ Students works


DIFFERENTIATION
Student Voice & Choice

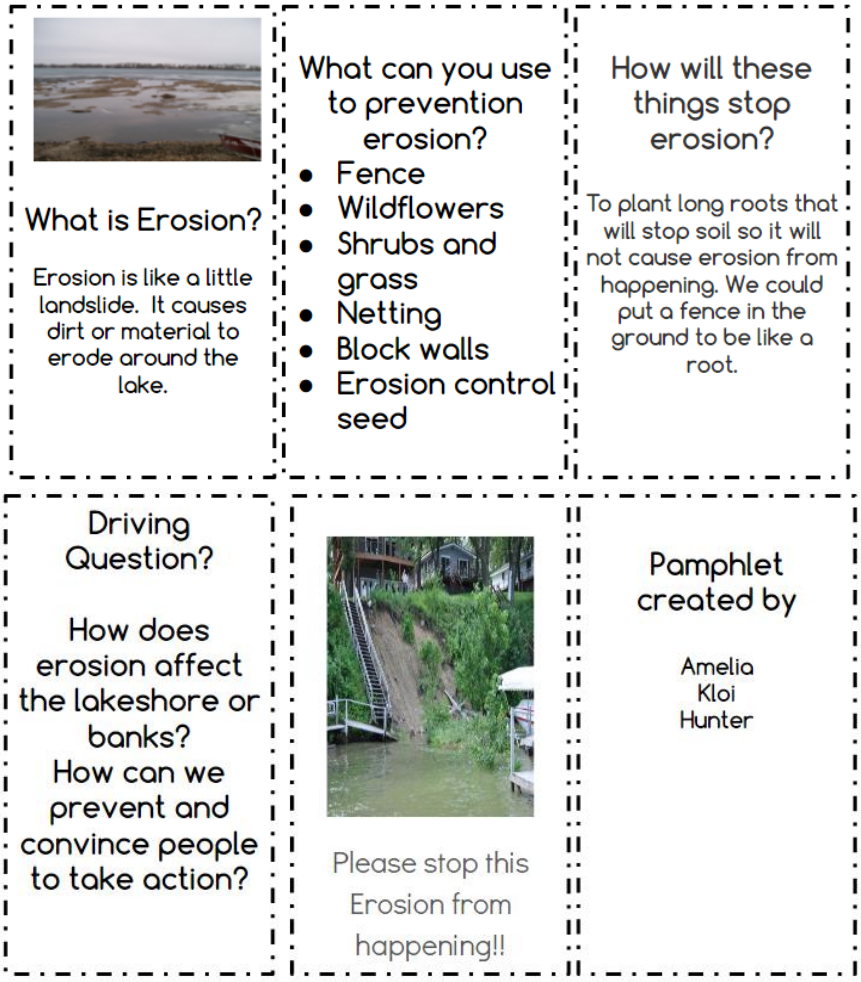

SELF REFLECTION OF PROJECT

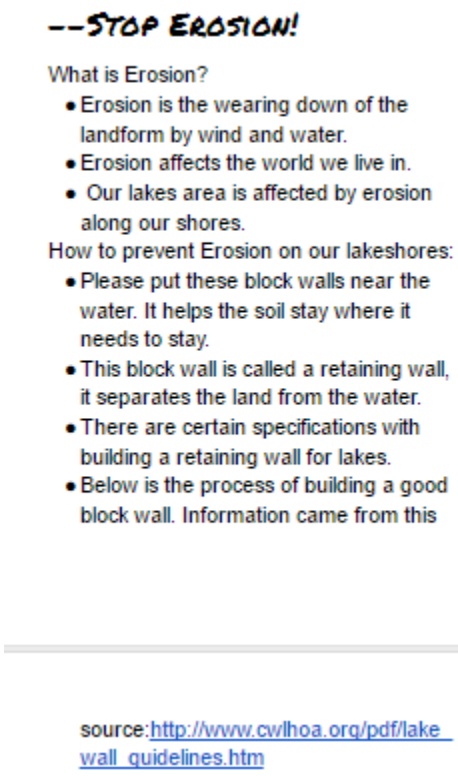

HOW DO YOU FEEL?

Appendix B

Student Work

These pamphlets were distributed to local business to hand out to customers.





--STOP EROSION!

What is Erosion?

- Erosion is the wearing down of the landform by wind and water.
- Erosion affects the world we live in.
- Our lakes area is affected by erosion along our shores.

How to prevent Erosion on our lakeshores:

- Please put these block walls near the water. It helps the soil stay where it needs to stay.
- This block wall is called a retaining wall, it separates the land from the water.
- There are certain specifications with building a retaining wall for lakes.
- Below is the process of building a good block wall. Information came from this

source:http://www.cwlhoa.org/pdf/lake_wall_guidelines.htm

Soil Erosion

If you don't know what soil erosion is, it is the wearing down of the land. Here is an example.

Mulch is a good way to prevent erosion. If you plant grass or wild flowers the roots will hold the soil together. There are also mulch mats to hold vegetation on slopes.

By Elliott

EROSION STOP IT

This is what could happen to the lakes. Erosion is the breaking down of the land around us.
It is bad for the environment. To see erosion go swim anywhere around the lakes area. You can stop it by plantings, but you could also try to put a silt fence at the end of the docks.One product that can stop erosion is silt sock.This is an example of non erosion.Perfectly flat land erosion and water can be a beautiful sight.

By Talen