WNY MIDDLE SCHOOL

Eisenhower Professional Development School

PROJECT 2007 – 2008

Instructors: Anthony C. Bertone, Math Teacher

Project: Bridge Building, "From the Past to the Future|"

Grade Level: 8

- Purpose: To research, collect information, learn new technology skills, create a technology presentation and create a three dimensional project.

Subject: Math

Academic and Technological Objectives:

- Students will work cooperatively together to make decisions and solve problems.
- Students will use the internet to research their project.
- Students will create explore the history of their bridge type and use that history to develop their own design.
- Students will use the West Point Design program to design, test, and develop their bridge.
- Students will design a PowerPoint presentation on their project incorporating all the aspect of the project into the presentation.
- Students will create a brochure using Microsoft Publisher to present their project.
- Students will collaborate with each other to discuss and solve problems.

Materials:

- West Point Design Program
- Microsoft Word, PowerPoint and Publishing Programs
- Computer Lab
- Reference Materials
  - Adkins, Jan. Bridges: From My Side to Yours. 1st ed. Brookfield, Conn: Roaring Brook Press, 2002.
  - Barter, James. The Golden Gate Bridge. San Diego, CA: Lucent Books, 2001.
  - Briscoe, Diana. Bridge Building: Bridge Designs and How They Work. Bloomington, Minn. Red Brick Learning, 2005
  - Haslam, Andrew and Barnes, Jon. Building. Lond: Two-Can, 1994.

- Nardo, Don. Roman Roads and Aqueducts, San Diego, Lucent, 2001.
- Willard, Keith. Bridges. 1st ed. Mankato, Minn: Creative Education, 1999, 2000.

Core Curriculum Standards:

Math Standards	4.2 A 1 a, b, c, d A 3 a, b, c, d A4 a, b, c A5 4.2 D 1, D2, D3, D4 4.5A 1, A2 a, b, c, d, A3
Technology Standards	8.1 A1, 3, 5, 8 B 3, 4 8.2 B3, 5

Lesson 1

Time period: 1 forty minute period

Objectives:

- Students will be introduced to the topic and the project.
- Students will be told that each team will need to produce a brochure, power point presentation, binder, design and 3 dimensional representation of their assigned bride.
- Students will be divided into four teams of 3-4 students per team.
- Each team will be assigned a bridge type.
- Each team will look through the reference materials and begin brainstorming.

Activities and Assignments:

- Students will be introduced to the project by the teacher who will assign each team a bridge type – Suspension, Truss, Cable Stay and Arch.
- Each group will select a team manager and give the name to the teacher.
- The team will decide which team members will responsible for a different aspect of the project and provided those names to the instructor.
- The instructor will introduce the students to the reference materials that will be provided and stored in the computer lab along with a list of possible websites.

Materials:

- List of team members and the bridge types they will be assigned.
- A collection of reference materials and websites.

Assessments:

Teacher will receive the names of the team member's assignment, as determined by the team.

Lesson 2

Time Period: 1 forty minute period

Objectives:

- Students will be introduced to the West Point Design Program.
- Students will run the various demo programs to see demo bridge designs and tests.
- Students will work with the design phase of the program seeing how each of the tool bar parts function.

Activities and Assignments:

- The teacher will introduce the students to the West Point Design Program using laptop and projection system.
- Teacher will demonstrate the various aspects of the program and how the different tool bars are used.
- The students will have the opportunity to go back to their computers and apply what they have learned by exploring the program and construct some practice designs and tests.

Materials:

- Computer lab
- Computer lap top and projection system
- West Point Design Program

Assessments:

The teacher will monitor the systems as they explore the various aspects of the West Point Design Program.

Lesson 3

Time Period: 2- 3 forty minute periods

Objectives:

- To review safety issues and the districts acceptable use policies for the Internet.
- Students will use the Internet to gather as much information as they can about the history of their bridge type
- Students will collaboratively discuss the information, summarize the information.
- Student responsible for this aspect of the project will create a summary to be evaluated.

Activities and Assignments:

- To have the students use the computer lab to find as much information has they can on the history of their bridge type using the internet.
- To have the students use the library reference materials to supplement what they discovered on the internet.
- Students are to collaborate and summary to be written.

Materials:

- Library reference resources as described in the material list.
- Computer Lab

Assessments:

The summary will be evaluated by the teacher.

Lesson 4

Time Period: 1 -2 forty minute periods

Objectives:

- Students will be given a list of terms for that deal with their bridge type to be researched and be included in their project.

Activities and Assignments:

- Students will use the internet and library reference materials to find the meanings of the following list of terms:

abutment	coefficient of thermal expansion
anchorage	compression
arch	deck
arch barrel	eye bar
base plate	flange
caisson	force
capstone	keystone
cable band	load
	overload
	stress

Materials:

- Computer Lab
- Microsoft Word

Assessments:

Students will submit a completed list of terms with definitions to create a glossary of terms.

Lesson 5

Time Period: 1 – 2 forty minute periods

Objectives:

- Students will research the advantages and disadvantages of the each teams bridge type
- Students will find using the Internet 5 worldwide examples of their bridge type.
- Students will find using the Internet the longest bridge of the bridge type they have been assigned.
- Students will use the internet to find and bridge collapses or disasters.
- Students will incorporate all of the above in their brochure and PowerPoint presentation.

Activities and Assignment:

- Have the students use the internet to find the advantages and disadvantages of their bridge type along with 5 worldwide examples of their bridge type.
- Have the students use the Internet to research the longest bridge of their bridge type and any bridge collapse or disasters.

Materials:

- Computer Lab
- Microsoft Word
- Library reference materials provided.

Assessments:

Teacher will monitor the progress of each group by observation.

Lesson 6

Time Period: 1 forty minute period

Objectives:

- Teacher will review the different building materials that will be used for the building phase of the project.
- Teacher will discuss the advantages and disadvantages of each building material.

Activities and Assignments:

- Teacher will discuss the following building materials:
  - Popsicle sticks
  - Spaghetti
  - Balsa wood
  - Straws
  - Toothpicks
- Each team will decide on the building materials they wish to use.
- Each team will decide how, where and when the building process will take place.
- Each team will purchase the materials needed for the completion of the project.

Materials:

- Computer Lab
- Microsoft Word

Assessment:

Each team will submit the building materials that will be used for the project.

Lessons 7

Time Period: 1 – 2 forty minute periods

Objectives:

- To get a project update from each team.
- To have the students begin a collaborative effort in the design phase of the project using the West Point Design Program, the information they have researched on their bridge type, and the advantages and disadvantages they have discovered.
- To have the students test and improve their designs based on the West Point Design Program.

Activities and Assignments:

- Using the computer lab and West Point Design Program each team will begin their bridge design.
- Students will collaborate on the design in their team and make decisions on improvements and weakness that need to be redesigned.
- Students will produce a draft drawing their design using the design program.
- Once the draft is approved the students will have 2 weeks to build their bridge using their design and built out of the materials they selected. Work on the bridge will be performed outside of school.
- Students will use a digital camera to record the building process step by step.

Materials:

- Computer Lab
- West Point Design Program

Assessments:

Students will hand in a design to the teacher for approval and evaluation.

Lesson 8

Time Period: 2 forty minute periods

Objective:

- To have the students create a brochure using all the aspects researched in their bridge project.

Activities and Assignments:

Lesson 9

Time Periods: 2 -3 forty minute periods

Objectives:

- To have each team create a PowerPoint presentation of their project incorporating all the aspects of their project.
- To have pictures of their build project to be part of the presentation.

Activities and Assignments:

- Students will use their research materials to create a PowerPoint presentation of their project.
- Each team will present their project to entire group along with their finished 3 dimensional project.

Materials:

- Computer Lab
- Microsoft Power Point and Word

Assessment:

Each finished project will be evaluated by the teacher.

Website Resources:

www.bridtecontest.usma.edu/download.htm
www.bridgesite.com/funand.htm
www.uwlax.edu/globalengineer/draft/project/Types%20of.html
www.natsuo-bridte.co.ip/english/bridtes/basic/truss.shtm
www.richmangalleries.com/trussbridges.htm
www.howstuffworks.com/ridtes3.htm
http://mysite.du.edu?~jcalvert/tech/machines/brides.htm
www.pbs.org/wgbh/buildingbig/bridge/
www.pbs.org/wgbh/buildingbig/bridges/basics.html
www.filebox.vt.edu/users/aschaeff/titlepage.html
www.mamma.com
www.ask.com
www.richmangalleries.com/archbridges.htm
www.mrdbridges.com/stonearch.php
www.sessign-technology.org/archbridges.htm
http://en.wikipedia.org/wiki/largestsuspensionbridges
www.inventionfacgtoy.com/history/rhabrige/sbtd/index.html
http://science.howstuffworks.com/bridge7htm
www.greatbuildings.com/buildings/clifton suspensionsbriges.html

PERSONAL NARRATIVE

This year's Eisenhower Project gave me the unique experience to work with students in a collaborative way. When I envisioned the project last year, I hoped that the students would take away from the experience an understanding of how collaborative thinking and problem solving techniques could be used to accomplish a task. Over the course of the last several months, I have seen students grow in their ability to solve problems and share their experiences with others. Our debriefing sessions enabled students to explore the problems that other teams experienced and brainstorm ideas on how to come up with solutions. One of the biggest problems that had to be solved was the construction of the 3 dimensional projects. Each type of building materials had its special set of problems. Each time a problem presented itself students pitched in and tried to offer a possible alternative method to solve the problem. The student use of the computer was greatly enhanced by learning how to use a design program to draft and test their project designs.

Student teamwork was an essential part of the project and the students were up to the task. Students selected their own project manager, delegated tasks, and worked collaboratively. Each student took a part of the project that showed their particular skill. As tasks were assigned students took the task and ran with them. Debriefing sessions were a key element in problem solving. Here students shared ideas and help other teams. In the end students showed that they had grown in their technology, problem solving, social and Math skills