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Mathematics Instruction Using Technology
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Constructivist Theory Lesson Plan

Introduction:

This lesson is a capstone project that will incorporate the constructivist theory. It will be introduced at the beginning of the semester and students will work on it throughout the semester to construct the final project. The project is to design a Google Site that is essentially a portfolio of the work the students created. This has the effect of having an overall summation of what they learned over the course of the semester, and in the process a review of the work they did. As the teacher we can also use this as a way to check in with the students to ensure that they are on track, and have compiled all of the right materials over the course of the semester.

The lesson will be used in a High School environmental science class where students have used technology throughout the year to investigate various concepts. The purpose of this project is not necessarily to reinforce any one concept, but to show the students how everything comes together, and makes sense as a whole.

Learning Objectives

Through this lesson students will learn:

- The importance of how all parts affect the whole, and how each part plays a role in the final product.
- How to analyze an individual part to determine how it fits in the whole.
- How to use technology to present their work.
- How to use this as a review for a final exam or mid term.

Lesson Components

Each student's web site will need to include the following projects that will be completed throughout the semester:

1. Customized Google Map with pictures and descriptions of the environmental sites that they visited.
2. A link to their section of the class wiki to which they contributed a topic on environmental science.
3. A slideshow of pictures with captions that depict an environmental phenomenon such as tornadoes, hurricanes, volcanoes, etc.
4. A page of links to journal articles that relate to their topic of environmental sustainability.
5. A concept map created in WebSpiration that details a "green" technology and its impacts on an environment.
6. A cause/effect diagram created by the student's group in Google Docs that explains the causes of environmental destruction, and its effect on the future of the environment.
7. An embedded podcast that details the struggle between the Southern Hemisphere and the Northern Hemisphere to come to a resolution on how to solve the environmental crises that we are facing.

Additionally the web site will be graded on its visual appeal, and aesthetic value. Students will also have to present their web site to the class in a coherent, and effective way. This presentation will be constructed in PowerPoint with screenshots. The students will not be allowed to simply navigate through the site as their presentation. The students will need to follow the school's

presentation rubric for the presentation, and will have s rubric for the web site that incorporates all of the aspects of the site. They will not be graded on the individual assignments as this has already been done. However, they will be graded on how well they were able to construct one, informative, and cohesive site that is not fragmented.

2 Forms of Technology

1. The web site that the students create will enforce the constructivist idea of knowledge construction. They will be able to show (almost unknowingly) how they have constructed their knowledge of environmental science over the course of the semester.
2. The presentation using PowerPoint enforces the idea of student-centered learning. Instead of the teacher lecturing, the students will tell each other how they see each part coming together to make a whole.

Three Components of the Constructivist Theory

*Taken from Melissa N. Matusevich's School Reform: "*What Role can Technology Play in a Constructivist Setting?" *from Montgomery Country Schools (May 1995)*

1. *"An important component of constructivist theory is to focus a child's education on authentic tasks. These are tasks which have 'real-world relevance and utility, that integrate those tasks across the curriculum, that provide appropriate levels of difficulty or involvement' (Jonassen, 1991, p. 29)"*
    a. The students in this lesson will be constructing a web site which is a task that they benefit from every day. But in this lesson they are the creators, and they get to use their creativity, and the experiences that they have had with other web sites to create their own.
2. "*Bagley and Hunter (1992) go on to say that active learning leads to greater retention and higher level thinking. And as knowledge continues to double every two years, and since it also has a shelf life, students must learn to access information; there is now far too much information to memorize."*
    a. In this project students learn on their own how to construct the "whole picture". They get to experience it as they develop their web site. Instead of the teacher telling them, and having them recite it on a test, they get to be the CEO of their own learning, as some would say, and find direction on their own. The teacher is available for guidance, but most of the learning happens individually.
3. Standard 11 of the assessment section states: *"The focus must be on originality rather than regurgitation; it is important to evaluate how the learner goes about constructing his or her own knowledge rather than the product."*
    a. This lesson focuses on how the student constructed his or her "whole" and not on the individual parts. They have already been assessed on the parts. This lesson is all about the whole, and how the students constructed his or her knowledge through the web site.