Title: Genetics

Author: Jennifer Dwojakowski

Grade Level: 9-12

Subject/Content: Science / Biology

Summary of Lesson: Students discover the tools, such as pedigrees, used by geneticists in predicting genetic outcomes and understand it well enough to create their own using real genetic data.

Focus Question: How can scientists actively track the passage of a genetically inherited trait through many generations?

Databases(s): Science In Context

Procedures:

Steps/Activities by teacher:

- Introduce the career of Genetic Counselor to the students then direct students to resources through the Science In Context, such as the article listed below, to learn more about genetic counselors and the importance of their role in predicting genetic outcomes in certain families.
  

- Give the students a list of genetic terms to define such as: genotype, phenotype, heterozygous, homozygous, dominant, recessive, pedigree, etc. as they read through the Science In Context reference article below.
  

- See possible Math tie below

- Have students collect at least six symbols from the image linked on the Pedigree Analysis topic page.
  
  
  o Make sure students draw and define all six symbols they chose.
• As a class access, "Three-generation pedigree analysis" Illustration by Argosy in the Science In Context. Carefully lead the students through the example explaining the terms and symbols used

• Help the students construct a homework genetic record table. The first column should list all of their family members by name; tell them to list names from at least three generations if possible. In the second column, they should indicate the person's relationship to them (ex. Ryan Smith – Maternal Grandfather). In the third column, they should place a check mark next to the individuals that possess a trait they have chosen (ex. Dark eyes, light hair, curly hair, etc). In the third column, have them record the genotype of each individual. If more then one genotype is possible for a given individual, if a dominant condition exists and an individual may be either heterozygous or homozygous dominant, record both possibilities

• SUGGESTION: Always give the students the possibility of tracing a fictional family if desired, although students who have the ability to trace their actual biological family seem to get more out of the activity, the point of the activity is to assess their understanding of pedigrees and genetic inheritance

• See possible Global Studies tie below

• Allow the students several days to collect their family information. Suggest that they bring in pictures of family members or other family lineage items that will make their project unique

• Help the students to construct their family pedigree using the information they have collected. Offer them poster board or large sheets of newsprint so they can be creative in the presentation of their pedigree

• See possible English tie below

• Be sure students are clear on the requirements of the activity, reminding them about items such as the correct format of the pedigree, a key that shows what trait is being traced through the generations and a title that includes their family name

• Offer supplies such as construction paper, glitter glue, stencils, etc
• Allow students time to share their pedigrees with the class. During presentation
time they can explain the trait they chose to trace and explain how the trait was
passed through the generations of their family

Steps/Activities by student(s):

• Review resource links your teacher gives you through the *Gale Science In
Context* to learn more about genetic counselors and the important tools they use
to predict genetic outcomes in certain families

• Define the list of genetic terms given by your teacher as you read through the
Web sites

• Collect at least six symbols used to construct a family pedigree. Draw and define
them

• Actively participate as the class constructs a simple example pedigree about a
single trait that is passed through a family

• Construct a genetic record table with the following criteria: title should be
"___(your name)___ Family Pedigree Data for ___(choose a trait to put here, ex.
dark eyes, light hair, curly hair, etc)____. The first column of the table should list
all of your family members by name. Record at least three generations of your
family including brother, sisters, aunts, uncles, cousins, etc. In the second
column indicate the person's relationship to you (ex. Ryan Smith – Maternal
Grandfather). In the third column, place a check mark next to the individuals that
possess the trait that you have chosen. In the third column, record the genotype
of each individual. If there is more than one genotype for a given individual, for
instance, if a dominant condition exists an individual may be either heterozygous
or homozygous dominant, record both possibilities.

• Using the data table you created, construct your own family pedigree. Use poster
board or large sheets of newsprint to be creative in the presentation of your
pedigree

• Be prepared to share your pedigree with the class by explaining the trait you
chose and how that trait was passed through the generations of your family

**Outcome:** Students will understand the importance of being able to trace genetically
inherited characteristics and how to construct a pedigree to show their knowledge.

**Related Activities:** This activity is easily integrated with:

**Global Studies** can be incorporating by:
• Having students also collect cultural, religious or immigration information about their family members to include on their pedigree, presenting more of a family tree perspective

**Math** can be incorporating by:

• Discuss the topic of probability or perform a Face Lab before beginning this lesson to show students the statistical reality of inheritance patterns.

**English** can be incorporated by:

• Have students create family history journals that recreate stories about family life from the past after they collect their family information. Through the eyes of a grandmother or grandfather maybe addressing the question, "What was life like back then?"