Assignment example: Perspectives-based genetics assignment

Sliding serious research

Curriculum objective: North Carolina Standard Course of Study: Competency Goal 3- The learner will develop an understanding of the continuity of life and the changes of organisms over time.
3.03- Interpret and predict patterns of inheritance- Dominant, Recessive, Multiple Alleles, Polygenic Inherit, Sex-linked traits, Independent Assortment, Test Cross, Pedigree, Punnett Squares.

Not yet ready/Basic	Ready/Proficient	Beyond ready/Advanced
Students will conduct investigative research that requires them to break down documentation and trace events over an extended period of time.	Students will conduct investigative research that requires them to explain patterns in science that affect multiple generations of populations.	Students will conduct investigative research that requires them to connect scientific concepts with human issues.
Students will research the Romanov Russian Royal Family and complete a detailed timeline tracing the history of hemophilia through the Romanov bloodlines. They will take on the role **"Historical Non-Fiction Author"** writing a detailed summary of how the sex-linked trait was passed on through the generations.	Students will research the Romanov Russian Royal Family and develop an annotated pedigree with genetic explanations of sex-linked patterns of inheritance as it affected each generation of the Royal family. They will take on the role of **"Medical Doctor"** and write a diagnosis and care plan for an affected individual.	Students will research genetic blood disorders and develop a pathfinder of related annotated websites. Using the gathered information from the research, they will act as a **"Litigation Attorney"** and establish a case that supports or opposes the decision to allow Queen Victoria, a known carrier of hemophilia to marry Russian Royalty.

Notes: Prior to research, students will participate in a lab activity in which they will trace a sex-linked trait through a population of imaginary cartoon babies. This is an example of a very generic activity that could be quick overview. All traits (ex. green or orange eye color) need to be pre-determined by the teacher.

Activity: Cartoon baby

Objective: To determine the pattern of inheritance for sex-linked traits by tracking chips with white markings.

- Students draw one chip from each of four brown paper bags. Each bag contains two possibilities for a specific phenotype for cartoon baby. (ex. Bag One: Red chip or black chip represents eye color. Bag two: Red chip or black chip represents nose shape.)
- One bag will be to determine gender of cartoon baby. Half of the female gender chips will have a white marking and one male will have white marking.
- After students draw chips and make cartoon baby, those with opposite-gender babies pair up. Students should note if their chip had white marking.
- After new pairs of P1 generation meet, they must work out Punnett squares to determine the probability ratios for their offspring. When determining gender, those with white spots pass this trait to offspring. They should note how male and females are affected by white marking. (Males with marking all have trait, only females with two marking have trait, females with one marking are carriers.)
- Discuss what would happen if they took Cartoon Babies and crossed the F1 generations. What patterns would they expect?

Sample pathfinder

http://www.hemophilia.org/NHFWeb/MainPgs/MainNHF.aspx?menuid=178&contentid=6

This site is from the National Hemophilia Foundation. It provides an overview of the history of hemophilia. It includes a pedigree chart and information about the Romanov family. It is also an excellent resource for further journal articles and medical studies about the disease.

http://www.thehealthguide.org/blood-disorder/symptoms-of-common-blood-disorders/

The Health Guide is a great site to find information about the various symptoms of different blood disorders. It is useful as a general guide to all blood disorders, but it also provides links for information about all various medical conditions.

http://kidshealth.org/parent/medical/heart/hemophilia.html

This user-friendly resource is geared towards school-aged students. There is useful information about hemophilia and other blood and heart related diseases. There is a Q-and-A link and many other reference links that are useful for both students and parents.

http://www.wfh.org/index.asp?lang=EN

The World Federation of Hemophilia has a useful website that provides information about worldwide conferences and access to medical information. This site has podcasts and newsletters that are current and relevant to research today.