Project 5: Variation and Inheritance – Eye Color Teacher Guide

Description:

The students will carry out a group survey on the occurrence of different eye colors. The data are recorded on the board (or collated by the teacher and provided as a handout). The students will enter the data on a spreadsheet and create their own chart or graph. Then they will use a wordprocessing document to complete the report. An Internet research component may be used as an extension.

Grade Levels: 7–10

Science Field: Biology

NSE Content Standards, National Research Council (Grades 5-8):

A. Science as Inquiry: Understanding and performing scientific inquiry

C. Life Science: Reproduction, heredity and diversity of organisms

E. Science and Technology: Technological design, science and society

NETS Performance Indicators (Grades 6-8):

1. Identify and solve routine hardware and software problems.

4. Use content-specific tools, software and simulations (environmental probes, graphing calculators, exploratory environments, Web tools) to support learning.

6. Design, develop, publish and present multimedia products using technology that demonstrates curriculum concepts.

7. Collaborate with peers, experts and others using telecommunications and collaborative tools to investigate curriculum-related issues and information, and to develop solutions.

8. Select and use appropriate tools and technology to accomplish a variety of tasks and solve problems.

NETS Performance Indicators (Grades 9-12):

8. Select and apply technology for research, information analysis, problem solving and decision making in content learning.

Materials:

Microsoft Excel 2003 and *Microsoft Word 2003*

Prerequisite Skills:

Students need to have basic proficiency in *Word* and *Excel*.

Suggested Time Allotment: One or two class periods

Process:

This section leads to a discussion on genetics, human characteristics and inheritance. Eye color is probably best dealt with after discussing other genetic characteristics, such as tongue rolling, ear lobes and widow's peaks. (**Note:** This exercise could be applied equally to each of these criteria; if so, only two columns of data would be obtained.) Most student data in the lesson will provide evidence that brown eyes are dominant. Exercise some care when following this up, as using alleles for dominant and recessive genes such as eye color is now considered to be polygenic. (See Web site addresses in student handout.)

Evaluation:

Assess the students on the quality of their charts and the quality of the data representation. Base further assessment on their genetic interpretation of eye color, including dominant/ recessive and polygenic alleles.

Extensions:

Discuss the Human Genome project and specialization among other species. Further information is available at **http://www.ornl.gov/sci/techresources/Human_Genome/home.shtml**

Technology Enrichment:

Students can convert their reports into *Microsoft PowerPoint* presentations. More advanced students can use the same process to create and represent data in Punnett squares and discuss probability factors in genetics.

Variation and Inheritance – Eye Color
Student Handout

❑ Launch *Microsoft Excel 2003* and begin a new workbook.

❑ Enter *Eye Color* as the title in cell C1 and *Number of Students* in cell D1. Adjust the cells to accommodate the data by selecting the column heading, then choosing FORMAT → COLUMN → AUTOFIT SELECTION.

❑ Enter the data (i.e., brown, blue, hazel, etc.) in column C until every eye color in the class is included in the table. In column D, enter the number of students who have each eye color.

❑ To plot a chart or graph of the data, click cell C2. Hold down the left mouse button and drag the pointer to the last data entry in column D. Release the mouse button and the cells will be selected.

❑ Click the CHART WIZARD button 📊 on the toolbar or select INSERT → CHART. Verify that COLUMN is selected as the CHART TYPE, then select CLUSTERED COLUMN as the CHART SUB-TYPE. Choose PRESS AND HOLD TO VIEW SAMPLE. The eye colors should be displayed as columns. Click NEXT twice.

❑ Title the chart *Variation in Eye Color*. Label the X axis category *Eye color* and the Y axis category *Number of students*. Click NEXT, then select FINISH.

❑ The chart should be displayed in the *Excel* workbook. Select the legend and delete it. Click the first eye color column. All columns should now contain a small square. Click the first column again to select it. Double-click and a dialog box will appear to present a choice of colors. Choose the appropriate color, click OK, then verify that the column now contains the correct color. Repeat this procedure for the other columns.

❑ Select the chart, then position the cursor over one of the resizing handles that appear around its edges. Hold down the mouse button and drag to increase or decrease the size of the chart.

❑ Experiment with different charts and graphs, then select the style that seems to best represent the data. Right-click and select FORMAT CHART AREA to experiment with different patterns, fonts and properties. Save and close the file, but do not exit the program. Minimize *Excel*.

❑ Launch *Microsoft Word 2003* to begin writing the report. Enter a title such as *Variation and Inheritance – Eye Color*. Format the text by highlighting it and then choosing FORMAT → FONT. Select the desired type style, size and color. Highlight the text again and set the text alignment by choosing FORMAT → PARAGRAPH, then making the appropriate selections. Press ENTER twice and begin writing a report on this exercise. Repeat the above steps to format the body of the report as desired.

❑ To import the data table created in *Excel*, position the cursor in the desired position within the *Word* document and select INSERT → FILE. Be certain that ALL FILES is selected in the Files of Type drop-down menu at the bottom of the dialog box. Find the appropriate file, select it, then click INSERT. If a dialog box appears, click OK. Resize and reposition as needed.

❑ To include the chart or graph created in *Excel*, exit *Word* by selecting *Excel* in the Quick Launch toolbar at the bottom of the screen. Open the appropriate file, click the chart and then choose EDIT → COPY. Next, minimize *Excel*, and the *Word* document should automatically appear. Position the cursor in the desired position, then choose EDIT → PASTE to insert the chart.

❑ To reposition the chart, right-click it and select FORMAT OBJECT. Select the LAYOUT tab and choose SQUARE as the WRAPPING OPTION, select the desired horizontal alignment: LEFT, CENTERED, RIGHT or OTHER, and click OK. Resize the chart until the chart is the appropriate size.

❑ While writing the analysis section of the report, the following Web sites may be useful:

http://www3.ncbi.nlm.nih.gov/entrez/dispomim.cgi?id=227240

www.fi.edu/tfi/units/life/forums/anatomy/eyes.html

❑ Save and print the report. Exit *Word* and *Excel*.