Section One: Project/Lesson Overview

Grade: 11

Subject: Physical Geography 110

Lesson Title: Make your own Geology Map

Lesson Description:. Use information from the New Brunswick Museum's Magnificent Rocks web site to identify areas across the province by the age and type of bedrock. In addition use this information to identify and explain the origin of selected local landforms.

Time Required: 3 x 60 minute classes

Curriculum Outcomes:

- Understand the origin and diversity of rocks.
- Identify and explain the origin of selected local landforms.

Section Two: Project/Lesson Implementation

Equipment/Materials Required:

Access to computers and www.nbm-mnb.ca/magnificentrocks
Map of New Brunswick showing community names
Access to Google maps to find communities mentioned in the magnificent rocks site that may be too small to be included on the provided map
Color pencils or markers
Geological map of New Brunswick.

Lesson Procedures/ Teaching Strategies:

1. Students should already be familiar with the geological time scale, major rock types and their origin, and the factors involved in the formation of landforms.

2. Ask students how they think Geologists produce maps. Do they think there is a Geology Map of New Brunswick?

3. Based on past teaching about the geological time scale ask students if they believe that the rocks in New Brunswick are all from one, or a few periods in geologic time, or if there are representatives from the entire history. These questions could be answered in a journal then discussed or simply discussed as a group from the beginning.

4. Introduce students to the **magnificent rocks web site**. Allow students to familiarize themselves with the layout and overview of rocks from the different geological periods.

5. Hand out copies of the **map of New Brunswick** showing community names. Students will also need computer access to locate small communities and areas not included on the map.

6. Using the **overview, community connections and familiar landscapes** sections of each geological period have students mark areas on the map that contain rocks of that period. Different colors can be used to represent the different periods.

    a. In addition students should produce a legend showing the rock type and age represented by each period.
        i. This information can be gained from all sections of the period description on the website.
            1. For example The Precambrian period is from 4.6 billion years to 542 million years ago and is made up of limestone which has been metamorphosed into marble. Graphite has also been formed during this process.

7. Once the map has been completed students should be encouraged to look for trends in the rock types, keeping in mind descriptions of how the rocks were formed, and possibly join together areas of similar rock types.

8. Students can then compare their maps to the geological map of New Brunswick. Do not provide access this map until this point in the activity.

    Have students answer the following questions based on their map.

    a. What similarities to do you see?
    b. What differences do you see? How can you explain these differences?
        i. Keep in mind glaciations, folding and overlaying of older rocks by younger ones.
    c. Why do you think there are some areas of the map that were not discussed on the web site?

9. Many of New Brunswick's landforms are a direct result of the kinds of rocks of which they are composed. Consider the following landforms and discuss how their geology and age has affected their appearance.

    a. The Appalachian Mountain Range (including Mt. Carleton and Sugarloaf Mountain)
    b. The beaches along Clifton and Stonehaven.
    c. The Hopewell Rocks

10. Economically the rocks, and the minerals they contain, have had a profound effect on New Brunswick? Describe key economic growth areas as a result of the geology of each of the periods studied.

    a. Precambrian – marble and graphite
    b. Cambrian – fossils, not economic minerals
    c. Ordovician – Brunswick mines
    d. Silurian – copper mines
    e. Devonian – granite for architecture
    f. Lower Carboniferous – potash, manganese, albertite, gypsum, oil and gas
    g. Upper Carboniferous – coal, sandstone
    h. Permian/Jurassic/Triassic/Cretaceous – dinosaurs only found in very small areas, not economic minerals

Suggested Assessment Strategies:

- Students will be graded based on their completed geology map.
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    - Marks will be assigned based on
        - The correct location of familiar landscapes and community connections.
        - Logical joining of geological types (it does not have to match the actual New Brunswick map as this is probably not possible based on the information given in the web site)

- Students will also be graded on their ability to answer the questions in sections 6, 7 and 8. All students may not have exactly the same answers but should use critical thinking skills and refer to information garnered from the website as well as topics covered previously in the course.

Section Three: Project/Lesson Resources

New Brunswick Geological Map available from the Dept. of Natural Resources and Energy

Supplementary Resources:
www.nbm-mnb.ca/magnificentrocks

Disclaimer: The recommended web-resources included here have been scrutinized for their grade and age appropriateness; however, contents on links on the Internet change continuously. It is advisable that teachers preview all links before recommending them to students.

Extensions: Additional activities could include.

- Studies of local architecture and rock types used. Linking of these rocks to the period of development.

- Studies of local mining activities and the particular formation of minerals which are of importance within that industry.

    - For example the formation of massive sulphides during the Ordovician period at Brunswick mines.

- Visits to local areas mentioned in the web site and study of the rocks in terms of minerals and/or fossil remains.

Section Four: Additional Information

Credits: Alice Walker, Bathurst High School, Bathurst, New Brunswick