Facts and Questions for Rocks and Minerals Concept

Alison L. Sullivan

Wilkes University

 The purpose of this paper is four fold. First, it is to show facts students would need to know before mastering a chosen concept. Second, it is to show examples of questions that can be developed from these facts. Third, it is to identify the questions as investigable or non-investigable ones and finally, it is to show how to turn a non-investigable question into an investigable one. The concept that I chose is from the Commonwealth of Pennsylvania’s Standards Aligned Systems website and it is a third grade science concept. It was chosen because my second grade class is currently studying rocks and minerals. I used a third grade concept because third grade is the closest published grade to second grade. To help develop facts and questions for the concept, I consulted the second grade science unit called, *Earth Materials* in the Discovery Education Science Tech book. The concept is: ***Rock is composed of different combinations of minerals.***

**SECTION 1: FACTS STUDENTS NEED TO KNOW ABOUT THE CONCEPT**

* Minerals are natural, solid substances.
* Minerals are found in rocks.
* Each mineral has a specific chemical make-up.
* Minerals form in the earth from nonliving materials.
* Rocks and minerals can be identified by their properties.
* The Earth is made up of rocks.
* Rocks come in different sizes and shapes.
* Examples of common minerals are: quartz, mica, feldspar
* Examples of common rocks are: slate, granite, limestone
* A granite rock is made up the minerals quartz, mica and feldspar.

 **SECTION 2: QUESTIONS DEVELOPED FROM THE FACTS**

* What is a rock?
* What is a mineral?
* What properties does a particular given rock have?
* What properties does a particular given mineral have?
* How are rocks and minerals alike?
* How are rocks and minerals different?
* What properties are the same or different for a given rock and mineral?
* What minerals are in granite?
* What minerals are in limestone?
* What minerals are in slate?
* What properties does each mineral have: quartz, mica, feldspar?
* What properties does the granite rock have that show the possible minerals within it?
* How do minerals form?
* Where can we find minerals?
* How do rocks form?
* Where can we find rocks?
* How are two given rocks different from each other?
* Is a rock a mineral?
* Does a given mineral appear to be made up of different materials or just one?
* What minerals do you see in a given rock?
* What materials make up the tiny pieces of a broken rock?
* What materials make up the tiny pieces of a broken mineral?

**SECTION 3: INVESTIGABLE OR NON-INVESTIGABLE**

The following questions are non-investigable because, according to our Topic C: “Understanding Question Types” they do not lead students to a way to create a plan where they could actually do something that would allow them to uncover the answer to the question. It also states that the question needs to be able to be investigated at the place and time of being asked. Some of these could be researched and answers could be found out through resources such as an internet web site, a science book or a reference book. However, the students would not be investigating by using some physical material, rather only reading material.

* **What is a rock?** This is non-investigable with available materials but would need to be researched.
* **What is a mineral?** This is non-investigable with available materials but would need to be researched.
* **How are rocks and minerals alike?** This is non-investigable because the answers would vary depending on the actual types of rocks and minerals that were being used. Students could investigate particular rocks and minerals, but they could not come up with general statement about how all rocks and all minerals are alike. The students would need to research this or find out through a video or other visual presentation.
* **How are rocks and minerals different?** This is non-investigable also because it would depend on the particular rock and mineral being investigated. A proven accurate statement could not be made for how all rocks and minerals are different. The students would need to research this or see a video or visual demonstration of this.
* **What minerals are in granite?** This is non-investigable because the students would need to have a piece of granite that has all of the minerals, quartz, mica and feldspar visible to the students and the students would have to know how to identify those minerals by name. The students would need to research this answer.
* **What minerals are in limestone?** This is non-investigable because the students would need to be able to identify the names of the minerals they see in a particular piece of limestone. Limestone can be made up of small pieces of rock or seashell fossils. It may be impossible for the students to identify those materials. The students would need to research this answer.
* **What minerals are in slate?** This is non-investigable because slate can be made up of many, many different minerals and the students would have to be able to name the type of minerals they see in a piece of slate they are observing. The students would need to research this answer.
* **How do minerals form?** This is non-investigable because the students would not be able to re-create mineral formation in their present place and time. The students would need to research this answer.
* **Where can we find minerals?** This is non-investigable because it is not something that can be done by working with materials. The students would need to research this answer.
* **How do rocks form?** This is non-investigable because the students cannot witness or re-create the formation of rocks. The students would need to research this answer.
* **Is a rock a mineral?** This is non-investigable because students cannot create a plan of action to demonstrate that all rocks are made up of minerals. They could possibly have some rocks that they can look at and try to identify minerals within the rocks. They would have an impossible charge to break rocks apart and see what types of minerals are inside. Even if they could, they would then need to have a reference to identify that the materials inside are minerals. This is something they could research to find the answer to.

The following are investigable questions because, as is described in our Topic C: “Understanding Question Types”, these could lead to a plan of action that students could investigate with materials that would be available. They can be investigated right in the classroom or the school yard in the place and time they are asked.

* **What properties does a particular given rock have?** This is investigable because the students could observe a given rock, use magnifying glasses, their senses, and measuring tools to identify the rock’s color, luster, shape, size, texture and odor.
* **What properties does a particular given mineral have?** This is investigable because the students could observe a given mineral, use magnifying glasses, their senses, and measuring tools to identify the mineral’s color, luster, shape, size, texture and odor.
* **What properties are the same or different for a given rock and mineral?** This is investigable because the student can observe properties of given rocks and minerals and visually describe how they are the same or different or they can record their observations and use the data to compare and contrast particular rocks and minerals.
* **What properties does each mineral have: quartz, mica, feldspar?** This is investigable because students could have a sample of each type of mineral and observe each using magnifying glasses, their senses, and measuring tools to identify the minerals’ colors, luster, shapes, sizes, textures and odors.
* **What properties does the granite rock have that show the possible minerals within it?** This is investigable because students could have a piece of granite rock and observe it using a magnifying glass, their senses, and measuring tools to identify the rock’s colors, luster, shape, size, texture and odor.
* **Where can we find rocks?** This is investigable because the students could go into the school yard, search for rocks and record the places they find rocks.
* **How are two given rocks different from each other?** This is investigable because students could have two different rocks and observe each using magnifying glasses, their senses, and measuring tools to identify the rocks’ colors, luster, shapes, sizes, textures and odors. They can record the properties of each and find their differences.
* **Does a given mineral appear to be made up of different material or just one?** This is investigable because students could observe the mineral and see whether it is made up of different types of materials or not.
* **What minerals do you see in a given rock?** This is investigable because students could observe the rock and see whether it is made up of different types of minerals or not. They may need a reference of labeled minerals to help them identify different minerals within the rock.
* **What materials make up the tiny pieces of a broken rock?** This is investigable with a softer rock that can be broken such as slate or with rough sand. The students can observe and describe the materials they see in the tiny pieces.
* **What materials make up the tiny pieces of a broken mineral?** This is investigable with a soft mineral that can be broken into tiny pieces. The students can observe and describe the materials they see in the tiny pieces.

**SECTION 4: FROM NON-INVESTIGABLE TO INVESTIGABLE**

Here are three similar questions about three different types of rocks. They are all non-investigable to begin with but have been pulled apart into more specific elements that can be investigated. The result was that in two instances more investigable questions were created from just one non-investigable question.

* **What minerals are in granite?** This is non-investigable.

Investigable: ***Does the granite have material in it that are similar to quartz?***

Investigable: ***Does the granite have material in it that resembles mica?***

Investigable: ***Does the granite have material in it that resembles feldspar?***

Investigable: ***What do you see in the granite rock that looks like minerals we have?***

* **What minerals are in limestone?** This is non-investigable.

Investigable***: Do you see small pieces in the limestone that look like crushed rocks or seashells?***

* **What minerals are in slate?**  This is non-investigable.

Investigable: ***What color is the slate?***

Investigable: ***What shape is the slate?***

Investigable: ***What does the slate feel like?***

Investigable: ***Do you see any materials in the slate that look like minerals we have?***

The questions that were formulated from the facts were all ones that I created. When I work with my second graders, all of these questions will not be used, and others that they create will be used. Their list will be qualified as this one was to make sure we all understand which ones we can investigate and which ones we will need to research to find the answers to.

References

Commonwealth of Pennsylvania: Department of Education. (2013). [web site] *Standards aligned system*. Retrieved from: <http://www.pdesas.org/>

Discovery Education: Science Tech book*.* (2013). [Online web site]. *Earth materials: Rocks and Minerals.* Retrieved from: [http://app.discoveryeducation.com/techbook2:concept/view/guidConceptId/b4991f6b-09ff-418b-bcba-303260ead83c/guidUnitId/a978b790-5990-4004-a9d4-a6c000fd5b6d](http://app.discoveryeducation.com/techbook2%3Aconcept/view/guidConceptId/b4991f6b-09ff-418b-bcba-303260ead83c/guidUnitId/a978b790-5990-4004-a9d4-a6c000fd5b6d)

EDIM 513: Inquiry Based Learning Instructional Media. (2010). *Topic A: Facts vs. concepts*. [Online course topic]. Wilkes Barre, PA: Wilkes University.

EDIM 513: Inquiry Based Learning Instructional Media. (2010). *Topic C: Understanding question types.* [Online course topic]. Wilkes Barre, PA: Wilkes University.

EDIM 513: Inquiry Based Learning Instructional Media. (2010). *Topic D: Turning questions from non-investigable to investigable.* [Online course topic]. Wilkes Barre, PA: Wilkes University.

Wikipedia. (2013). [web site]. *Slate*. Retrieved from: <http://en.wikipedia.org/wiki/Slate>