SLEEP I: WAVE PATTERNS!

Grade Level: 5

Subject Areas: Science, Math

Key Concepts: Electrical activity in our brains corresponds to different states of consciousness.

Key Cognitive Skills: Observation
Comparison

Set up: obtain materials; copy worksheets

Background Information

There is electrical activity in the brain. There is high frequency electrical activity in the brain when a person is awake and alert, as well as during some periods of sleep. There is low frequency electrical activity in the brain when a person is awake but not concentrating and during some periods of sleep. This activity can be measured with an electroencephalogram, the output of which is in the form of wave patterns.

Vocabulary

qualitative
quantitative
frequency
wave crest
amplitude

OVERVIEW

Drumbeats are used to represent brain waves during different states of consciousness. Students are asked to describe drumbeats in both qualitative and quantitative terms. A distinction between qualitative and quantitative is derived from the class. Students record drumbeat frequencies over 10 second intervals. The class determined frequencies are then plotted in the form of wave patterns, each complete cycle from nadir to peak to next nadir representing a drumbeat, plotted over time.

GOAL

Students collect and analyze data on frequency of events over time and create graphic representations of that data.

SPECIFIC OUTCOMES

- Quantitative descriptors describe things numerically
- Qualitative descriptors describe things by their qualities ie. color, shape or relative rate.
- Frequency is the number of events over time.
- Frequency can be represented by wave patterns.
- Electrical activity in the brain corresponds to our state of consciousness.
- Electrical activity in the brain an be represented by wave patterns

MATERIALS

For Instructor

- brain wave chart
- drum

For each student

- handout for recording frequency

PROCEDURE

Engage: (10 minutes)

Play a beat on the drum. Ask class for descriptions of the rhythm.

Explore/Explain (10 minutes)

- Lead discussion to the idea that the class is providing qualitative descriptions of the rhythm.
- Give examples of other qualitative descriptions and have class give qualitative descriptions of objects around the

North Carolina Standard Course of Study

Science

• Goal - The goal for fifth grade is to investigate energy interactions.

• Competency Goal 2 The learner will build an understanding of forms and sources of energy.

(Brain waves are discussed in this lesson as a measure of the electrical activity in the brain.)

• Science as Inquiry - Students must actively participate in science investigations, and use the cognitive and manipulative skills associated with the formation of scientific explanations.

(Students collect and analyze data on frequency of events over time and create graphic representations of that data.)

Math

Major Concepts

• Addition, subtraction, and multiplication of fractions

• Computational Skills to Maintain

• Add and subtract multi-digit numbers

• Divide using single digit divisors

(Students are asked to determine frequency, involving addition of the events divided by the number of seconds over which the events occur. Some of the graphic representations reinforce addition of fractions of units.)

room.

• Explain definition of quantitative descriptions.

• Give examples of quantitative descriptions.

• Ask for other quantitative descriptions from the class.

Expand (10-15 minutes)

• Lead discussion to frequency as a quantitative descriptor for the number of occurrences of something over a period of time.

• Draw a wave crest on the board.

• Show and explain poster of representative brain waves for the different states of consciousness.

• Play beats on drum representing brain wave frequencies.

• Ask students what they think might be occurring while the different activity levels are recorded in the brain.

• Lead discussion to the concepts of high frequency electrical activity in the brain when a person is awake and alert, as well as during some periods of sleep, and low frequency electrical activity in the brain when a person is awake but not concentrating and during some periods of sleep.

Re-engage - Reinforce: (20 minutes)

• Play synchronous rhythm on drum for 10 seconds, while students count the number of drum beats played.

• Ask for the beat numbers recorded by several students and write them on the board.

• Discuss concept of averaging and have class calculate,as a group, the average number of beats recorded from those provided in class.

• Draw a wave pattern representation of the average number of beats recorded for the 10 second interval and have students draw this wave pattern on their handout.

• Repeat this process several times.

Evaluate: (10 minutes)

Students complete frequency handout.

Project 2061
Benchmarks for Scientific Literacy

• Grade5

Nature of Science
A. Scientific World View
B. Scientific Inquiry

(Students collect and analyze data on frequency of events over time and create graphic representations of that data.)

Nature of Mathematics
A. Patterns and Relationships
C. Mathematical Inquiry

(Students are asked to determine frequency, involving addition of the events divided by the number of seconds over which the events occur. Some of the graphic representations reinforce addition of fractions of units.)

The Human Organism
C. Basic Functions

(Students learn that different states of consciousness correspond to different patterns of electrical activity in the brain.)