Patterns in our World

Summary

This is a cross-curricular unit plan for 7th grade math, language arts, music, and science classes which focuses on patterns in our world. Although this is an 8-week unit, we will be presenting five+ complete daily plans incorporating the various curricular areas as models of the types of things students will be doing in each of their content classes.

Time Frame

5 class periods of 90 minutes each

Group Size

Small Groups

Life Skills

Thinking & Reasoning

Materials

MATH: Lesson 1

Graphic Organizers for use in text lesson.

LANGUAGE ARTS: Lesson 1

PowerPoint

LANGUAGE ARTS: Lesson 2

Computer workstations for Virtual Field Trip
Written instructions for accessing the field trip
Worksheet to answer questions on Poetic Elements

SCIENCE: Lesson 1 (Introduction to natural patterns)

Computer and projector
Photos from 'nature_pattern_images.zip' attachment
Photostory (PC) or iPhoto (Mac) software
Accompanying music

SCIENCE: Lesson 2 (Use of Technology by learning & teaching about Phi in nature)

Computer access for each student group
PowerPoint software
Handout for each student

When it's time for the groups to present their PowerPoint:

A computer attached to a digital projector
This computer must have PowerPoint on it
A method for getting each groups' PowerPoint files onto this presentaion computer.

MUSIC: Exploration Station 1 (Music patterns)

Task Cards Pre-recorded music CD's or live performers willing to play for the class
CD Players or Computers with headphones to play the CD's
Worksheet assignment for students to complete and turn in at the end of the lab Vocabulary

cards English & Spanish
Decade timeline created for display
Access to satellite radio if possible. If not possible then look on the Internet and print off a program listing for one of the stations. XM or Sirius.

MATH: Exploration Station 2 (www.activity)
Computer access for each student group
Measuring tape for each student group
Printer access with a transparency for each student group

Background for Teachers

MATH: Lesson 1
This lesson incorporates reading strategies and current research. In *Classroom Instruction that Works* (ASCD, 2001), Robert J. Marzano et al found summarizing and note taking to have a significant effect on student learning. In order to be effective, students must be taught how to summarize. Summarization frames for all types of text summaries are included in the document link so teachers can utilize summarization more effectively in their classrooms. For the purpose of this assignment, students will be asked to use the argumentation frame, using the information in the articles to prove the claim that Leonardo Fibonacci is a significant figure in the history of mathematics. A sample framed paragraph is also included to further scaffold effective summarizing for students who need extra support in their writing.
Math Lesson 2
lesson plan
SCIENCE lessons
Four of the five science lessons involved small group collaboration of students when using computers. Popejoy (2003) states, "In the classroom, we found that it was not imperative that each student have access to his/her own computers at all times. In fact, most students reported that they worked better in pairs or trios when using the computer, which was confirmed by my observations." Wetzel et al. (2001) state that students remain engaged when working in groups with computers. "Today I was watching students working in all corners of the room. While I was helping one (group of) students edit their animal report, I looked around and everyone was busy, helping each other with typing, getting ideas synthesized into paragraphs or finish up poems and drawing for their reports. There was plenty of activity and noise, but everyone was on task. Ms. Li Gr. 4"
As a result, students working in small groups often collaborate and peer teach. Each group will also be given the opportunity to peer teach to the other groups in the class.
MUSIC: Exploration Station 1
This lesson is to help students become aware that distinctive patterns can form when different combinations of rhythmic sounds and beats in music occur. After participating in this exploration station, students will begin to be able to identify which decade a presented recording comes from. They will be more focused on hearing the patterns being played by the instruments and sung in the lyrics of a song after this learning experience.
LANGUAGE ARTS: Lesson 1
Why is alliteration important? Marilyn J. Adams states that alliteration brings about phonetic awareness in the student (1990). In her article, Hallie K. Yopp suggests that "further reading instruction heightens their awareness of language, assisting then in developing the later stages of phonemic awareness…" She offers the following general recommendations for phonemic awareness activities:

Keep a sense of playfulness and fun, avoid drill
Use group settings that encourage interaction among children.

Encourage children's curiosity about language and their experimentation with it.
Allow for and be prepared for individual differences.
Make sure the tone of the activity is not evaluative but rather fun and informal (1992).

This activity will allow the student to apply the technique of alliteration and reinforce their writing and reading skills.

LANGUAGE ARTS Lesson 2:

Technology station: Students need to have completed lesson 1 about alliteration and the exploration station in which they find examples of alliteration in magazines, newspapers, etc., before beginning the technology station. They will deepen their understanding of the patterns in poetic elements and poetic forms by participating in a virtual field trip titled, "Patterns in Poetry."

MATH: Exploration Station 2 (www.activity)

This exploration is a web activity. Students will click on the links provided which will take them to some sites with information on phi. After reading the content they will answer the questions and do the activities under the original links.

Student Prior Knowledge

MUSIC: Exploration Station 1

Students should be familiar with the different kinds of musical instruments and their sounds. They should know the difference between big band and orchestra sounds. Students should know that a decade is a period of time equaling 10 years. They should know a little bit about the different genres and how music is categorized.

Intended Learning Outcomes

As a result of this unit, students will:

KNOW: key terms (i.e., patterns, Fibonacci, tessellations, rhythm, rhyme, alliteration, assonance); how to use phi; poetic forms (i.e., sonnet, diamante, haiku, free verse, two-voice poems); musical genres (i.e., rap, classical, jazz, etc.); scientific classification and deriving information from a web site for peer teaching; define alliteration and recognize examples of it not only in poetry, but in their everyday world.

UNDERSTAND: How patterns shape our world; That patterns are everywhere; Patterns create beauty, order, strength, and survivability.

DO: use graphic organizers; use www.activity pages, compare and contrast various genres of music; use phi; create tessellations; evaluate and write various forms of poetry; correctly classify animals and plants by examining their patterns; create a poem that contains at least three examples of alliteration while maintaining one central theme.

Instructional Procedures

MATH: Lesson 1

Building Background: Who was Fibonacci? What were his contributions to the world?

Students will read two articles about Fibonacci and complete a graphic organizer prior to writing a summary paragraph about his contributions to the world.

Objective: To prepare students to do math exercises using phi.

Lesson plan: Access the web site "Fibonacci Number" and show the students the cartoon strip. Tell them that today they will be learning more about the man called Fibonacci and his contributions to math and the world. Students have the choice between four different on-line articles. Students will read two of the four articles and complete a graphic organizer summarizing the key points of the articles. They will then write a argumentative summary of the articles supporting the claim that he is a significant figure in math history, and submit it to their teacher. Two of the articles can be accessed through SIRS Discoverer: "Leonardo Fibonacci and the Numbers in Nature" by John Hudson Tiner,

and "Leonardo, Man of Numbers" by Margaret Etherton. The other two are linked on this site: "Leonardo Pisano Fibonacci," and "Golden Blossoms, Pi Flowers."
SCIENCE: Lesson 1 (Introduction)
Building Background: Are there patterns in nature? Why study patterns? Give an example of how understanding a numerical pattern might be useful. Students will be shown images of patterns in nature and complete a guided discussion on the importance of patterns in nature.
Objective: Students will be prepared to find and present on phi patterns in nature.
Lesson Plan: Using the images from nature_pattern_images.zip (available as a download from this page), the images should be presented as an introduction to the patterns in nature discussion. Use PhotoStory or iPhoto with music to present these images. Following the images presentation, guide a discussion about the importance of patterns in nature. Have students provide examples of patterns and some of the reasons why it might be helpful to study them. Tell students they will investigate a numerical pattern, and how it relates to the world around them. Be sure to include a brief discussion of camouflage, structure of animal homes, the classification schema, and animal migrations.
Preparation for Unit Teaching: Assign small student groups (a total of five). You may want to start these groups working together by having each group do the exercise "Seeing through Camouflage" found in the diverse learners section of this lesson unit.
Note: It may be a good idea to have at least one advanced learner, who is comfortable working on computers, in each small group.
SCIENCE: Lesson 2 (Phi in Nature)
Building Background: Does phi exist in nature? How is phi manifested in nature?
This is a constructivist lesson plan where students will go through a WebQuest in their small groups. Upon completion of the WebQuest, each group will have the opportunity to teach about a specific area of nature that uses phi.
Objective: Students will learn that concepts taught in math class are important throughout our world. They will learn effective peer teaching within their small group and as teachers for the entire class.
Lesson Plan: Assign each of five groups a topic found in the WebQuest. Topics are: Petals on Flowers, Seed Heads, Pine Cones, Leaf Arrangements, and Vegetables & Fruits.
Scaffold your students into learning their assigned topics and preparing their presentation. Be sure they each have a copy of the rubric, so they are fully aware of expectations.
MUSIC: Exploration Station 1 (Patterns in Music)
Know -- Key Terms; Instrument Sounds; Different Artists (their favorites).
Understand -- How patterns shape our world; that patterns are everywhere and in everything and they create beauty; strength and order in our lives.
Do -- Compare and contrast various genres of music -- explore satellite radio.
Instructional Procedures - You are going to listen to several different songs. I will play the first one. I want you to listen for the different instruments. What are the drums doing? the piano? the guitar? How many instruments can you identify in this song? I want you to choose one of the instruments you have identified and clap along with the sound of the instrument matching it's rhythm. Really listen to the beat and the pattern of the instrument. How is it mixing in with what the other instruments are doing?
Study the patterns in each song I have recorded on the CD for you. When you are finished listening and studying each one, write the names of the songs under the decade they belong. You may work together quietly.
LANGUAGE ARTS: Lesson 1
Building Background: What is alliteration? Students will view the PowerPoint prepared to become familiar with the concept and view some examples.
Objective: To prepare students for creating their own alliteration poems.
Grouping: Whole Class with individual assignment following instruction.

Lesson plan: Students will access and view the PowerPoint, Alliteration. Through this lesson station the students will become familiar with the concept and view some examples of alliteration. At the end of the presentation students will be given directions to create their own alliteration poem that contains at least three examples of alliteration while maintaining one central theme and add a related image on a PowerPoint slide. Once all students have created their slide, the instructor will compose a slide show for the entire class to view.

LANGUAGE ARTS: Lesson 2

Technology Station: Students will learn the patterns found in the elements of poetry (e.g., rhythm, rhyme, repetition) and how these patterns help create the various forms of poetry (e.g., sonnet, pantoum, sestina, etc.)

Preview the site witht the students to make sure they know how to navigate through each section. Provide students with the worksheet on elements of poetry for them to take notes on as they explore the site.

This web-based activity will probably take two class periods or more to complete. Students are to write original poetry in at least two of the forms they researched and submit them to the teacher and to an on-line poetry site. Links are provided within the field trip.

At the conclusion of the field trip, students are to enter the postboard and post a comment about something they learned. They are also required to respond to another student's comment.

MATH: Exploration Station 2 (www.activity)

Building Background: What is phi? Where can you find it in our every day world?

Students will do a www.activity and answer questions that build their knowledge of how phi is all around them. They will get some hands on experience by downloading a grid and measuring things in the room.

Objective: To help students see how math patterns are all around them.

Lesson plan: Ask students what the pyramids of Egypt, the proportion of the human body, and a credit card have in common. Tell them they can find the answer with this web activity. Have them access the activity url, follow the links and answer the questions. Once the activity is concluded students can compare notes on which objects were found that measured correctly in the grid.

Strategies for Diverse Learners

MATH: Lesson 1

Readers have the choice between 4 different articles of varying reading levels so they can choose the article that best meets their ability. An argumentation frame is given for all students to use to scaffold their ability to summarize appropriately. In addition, a framed paragraph is provided here to support struggling writers as they work on their summarizing skills.

SCIENCE: Lesson 1

If you have students who want to learns more about camouflage in animals, you may have them use the web site "Seeing through Camouflage" so they may better understand why animals and insects use patterns as camouflage.

You might also want to point your advanced learners to the "Fibonacci Puzzles" web site. The link can be found in the "Web Sites" link below.

MUSIC: Exploration Station 1

Language learners can listen to musical styles, rhythm and beats without any additional assistance. The only adaptation you might do for them is to have flash cards made with the music terminology written out in their language. The worksheet assignment could also be created in different languages.

LANGUAGE ARTS: Lesson 1

For ELL Students: Alliteration is used in poetry and writing in many different languages-not just in English. Students can access the web site:
http://www.englishspanishlink.com/stories%20and%20poems.htm and read poems in both English

and Spanish, looking specifically for alliteration. Some possible poets to study: Francisco Alarcón (his poetry is in both English and Spanish and often times in both languages. Purchase some of his childrens' poetry books in two languages http://www.childrensbookpress.org/ob/lt.html; Gary Soto (who writes about his experiences as a Chicano growing up in California) <<a href="http://www.poemhunter.com/p/m/poem.asp?poet=10856&poem=175975" target="_blank">http://www.poemhunter.com/p/m/poem.asp?poet=10856&poem=175975> or Gary Soto Lesson plans http://falcon.jmu.edu/~ramseyil/soto.htm. You can also direct students to the World Poetry Translation Project which has lists of poems and poets and at least one example of their poetry. Scroll down and click on the language and it will translate the poem into one of eight different languages.

Extensions

MATH: Lesson 1
Students will be given opportunities to explore how the Fibonacci sequence is used in art, architecture, and science. They will find examples in nature and conduct experiments and mathematical calculations using pi.
SCIENCE: Lesson 1
Students will be given the opportunity in Science: Exploration station #1 to classify animals from pictures on a web site.
MATH: Exploration Station 2 (www.activity)
Students that want to learn more about what phi is and where it is around them can search the goldennumber.net web site. More questions could be created could be answered along with doing hands on research.
MUSIC: Lesson 2 Explore music of different cultures. Learn dances from different cultures. Listen to the patterns in music from different cultures. Notice that the Hawaiian Hula dance is not the same as the Italian wedding dance.

Assessment Plan

SCIENCE: Lesson 2

- Grade the group worksheet for thoughtful answers
- Use the PowerPoint Presentation rubric for each groups PowerPoint preparation and presentation.

MATH: Lesson 1

- Use the Summary Paragraph Rubric to score the student's ability to summarize important information when reading. Information in the summary must come from the articles, but can be supported by student background knowledge.

Rubrics

PowerPoint Presentation
Summary Paragraph Rubric

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