Understanding Noise Impacts on Concentration

Description:

In this lesson, students will experience the effects that noise can have on a classroom environment through a short experiment. Students will complete a puzzle under two different conditions: once in silence and again in a loud environment. Students will compare the situations through statistical calculations and scatter plots. Using data from the experiment, students will discuss how noise impacts performance and concentration.

Objectives:

- Calculate statistical information about the impacts of noise on concentration
- Demonstrate how noise can affect concentration, attention, learning, studying, and other essential classroom actions
- Discuss the importance of finding a quiet environment to work in

Vocabulary:

Noise pollution

Materials:

- "Sound and Noise Sudoku 1" worksheet
- "Sound and Noise Sudoku 2" worksheet
- Graph paper
- Calculators (optional)

Background Information:

In the environment, unwanted or unpleasant sounds from the surroundings are often referred to as noise pollution. In large cities such as New York City, noise pollution is a struggle many individuals are confronted with every day.

Everything from taxi cabs to construction sites can contribute to noise pollution. Studies show a direct link between noise pollution exposure and high levels of stress, decreased concentration, and other health related issues. It is crucial that we understand and address these issues in our urban environment.

Method:

- Begin this activity without explaining the objective or procedures to get the best result (blind experiment). This lesson includes two sample Sudoku puzzles, but you can choose any two similar puzzles or activities, including those provided in the Sound and Noise Vocabulary Games worksheet, for students to try completing (with and without noise as a distraction).
- Distribute the "Sound and Noise Sudoku 1" worksheet and explain only the directions of the worksheet. Tell students they will have 10-15 minutes to complete it. When the timer begins, play loud music and/or make other loud distracting noises.
    - To make checking the work easier, it may be helpful to have students use blue pen or pencil on the first worksheet and red pen or pencil on the second worksheet.
- Close all windows and doors to create the quietest environment possible. Make sure students are not talking or making any sounds. Hand out the "Sound and Noise Sudoku 2" worksheet and allow students the same allotted time to complete it.
- Post the worksheet answer key on the board.
- Review both worksheets together. Have students count the number of correctly filled in spaces on each worksheet. Collect the data of their results on the board or on a computer.
- Explain to students that they were participants in an experiment that measures noise impacts on concentration.

- Explain that the data collected from worksheet 1 was testing the ability to concentrate in a noisy environment.
- Have students calculate the average number of squares the class correctly completed for worksheet 1.
- Explain that the data collected from worksheet 2 was testing the ability to concentrate in a quiet environment. Have students calculate the average number of squares the class correctly completed for worksheet 2.
- As a class, have all students share their data. Calculate a mean, median, and mode for the data collected.
- Have students visualize the mean, median, and mode data graphically in a bar graph. The x-axis should be the test # and the y-axis should be the number of squares that were completed.

Discussion:

- Discuss the results and experience with the class. Did you do better on one puzzle compared to the other?
- How did you feel during the tests? Did you feel differently during the test sessions?
- What do you think is the impact of noise on performance and concentration?
- How would you describe the sound environment within your school?
- Where do you normally study or do your homework? What is that sound environment like?
- What changes would you make to create a better environment in terms of noise level for you and other students?

Extension:

- Re-try the test as a non-blind test.
    - How are the results different now that students are aware of the test objectives?
- Challenge students to try the test with different levels of noise (i.e., silent, relatively low speaking volume, medium speaking volume, and relatively high speaking volume).
    - Using the data collected, have students create a correlation analysis to determine the relationship between speaking noise and the number of squares that can be correctly completed.
- Have students brainstorm ways to keep their school a quiet learning environment.
    - Examples: have teachers shut doors when doing a group activity; create posters to ask students to walk quietly down the hallway.
- Have students write a persuasive letter to the principal regarding noise in the school.
    - What is their proposal?
    - Where in the school should simple rules be implemented?
    - How will it benefit the students? Make sure to reference the data collected on how loud environments affect concentration and learning.
- Have students read the following article, Urban noise pollution is worst in poor and minority neighborhoods and segregated cities, and answer the following questions in order to increase understanding of noise pollution as a justice issue.
    - Which social groups are more exposed to noise pollution?
    - What factors does the article cite as explanations for this phenomenon?
    - Do you believe that U.S noise maps could help address this issue? Why or why not?
- Introduce NYC's Environmental Justice for All Report to students and have them read comments 39, 47, and 75 from the Scope of Work Report (pages 46, 49, and 56, respectively). What are some concerns that New York City residents have about noise?

Name: _____ Date: _____

Sound and Noise Sudoku 1

Directions: Every column and row should have one of the nine sound symbols from the key below. They cannot repeat and all of the sound symbols must show up in each column and row. Using the given sound symbols, fill in the missing characters.

	2	1	5			9		
4			7		9			2
9	7	3		4			6	1
7	9				5			3
		8	6	7		4		
3			9	2			5	8
2	3			6		1	9	5
1			3		4			6
		9	1			3	7	

Character Key

Stereo 1	Plane 2	Rain & Thunder 3
Bird 4	Train 5	Ice Cream Tunes 6
Jackhammer 7	Garbage Truck 8	Cafe 9

Name: _____ Date: _____

Sound and Noise Sudoku 2

Directions: Every column and row should have one of the nine sound symbols from the key below. They cannot repeat and all of the sound symbols must show up in each column and row. Using the given sound symbols, fill in the missing characters.

		 4	 8	 6		 3		
	 9		 2		 3	 4	 6	
 8		 3			 7	 5		
 6	 3			 2			 9	
		 5	 9	 8		 1	 2	
	 1				 4		 5	
 3	 4	 6		 7	 2	 9		
 1					 8	 2		 7
		 7	 3	 1				 5

Character Key

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