

Statistics and Probability: Air Quality Activity

Major Objectives:

Using an interdisciplinary approach students:

- Increase mathematical skills of data collection and analysis
- Gain an understanding of local issues and increased awareness of air quality

Prescribed Learning Outcomes:

Data Analysis

D1 Describe the effect of

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|-----------------------|------------------|----------|
| -bias | -use of language | -ethics |
| -cost | -time and timing | -privacy |
| -cultural sensitivity | | |

on the collection of data

D2 Select and defend the choice of using either a population or a sample of a population to answer a question

D3 Develop and implement a project plan for the collection, display, and analysis of data by:

- formulating a question for investigation
- choosing a data collection method that includes social considerations
- selecting a population or a sample
- collecting the data
- displaying the collected data in an appropriate manner
- drawing conclusions to answer the question

Instructions:

1. **Have a brief discussion about air quality in the region. (5-10 minutes)** Help students identify that local issues can be relevant to and incorporated into our learning, even mathematics. Discuss contributors to pollutants in the airshed. (Eg. transportation, industry, restaurants, tire treading companies, open burning, heating and energy use, fugitive dust, forest fires, etc.). Refer to Air Pollutant Briefing Notes in Appendix D of Resource Package for more detailed pollutant sources and types of pollutants.
2. **Invite students into the process of creating a project plan** for collection, display and analysis of data connected to the topic of air quality.
3. **As a class, formulate a question for investigation.** For instance, students could choose to investigate the type of transportation staff and or parents are using. This could be an assessment of the type of vehicles found in the parking lot such as economy size car, mid-sized car, SUV, van, utility van, and truck specifying if any of the vehicles are diesel or hybrid. Students could briefly research fuel economy and emissions of the above classes of vehicles. Information could be collected via survey or observation. Other questions that could be assessed include: idling time, number of

students who carpool or use active transportation to get to school, cost of fuel per month, distance to travel to school, households that heat home by burning wood, prevalence of asthmatics in a population, etc.

- 4. Choose a data collection method.**
- 5. Select a population or a sample.**
- 6. Discuss how bias, cost, cultural sensitivity, use of language, time and timing, ethics and privacy apply to the question of investigation.**
- 7. Display the collected data in an appropriate manner.** There are numerous ways to graph data. Get students to recall the following types of graphs:
 - Circle graph – shows percentages, fractions or parts of a whole
 - Stem-and-Leaf graph – shows the number in a large data set arranged by place value
 - Bar graph – compares two or more values
 - Double bar graph – compares two sets of data
 - Pictograph – compares two or more values that are multiples of a number
 - Line graph – shows a value that changes over time
- 8. Have students independently or in groups draw conclusions regarding the question.**