Scientific Method In Real Life

The Strange Case of BeriBeri

In 1887 a strange nerve disease attacked the people in the Dutch East Indies. The disease was beriberi. Symptoms of the disease included weakness and loss of appetite, victims often died of heart failure. Scientists thought the disease might be caused by bacteria. They injected chickens with bacteria from the blood of patients with beriberi. The injected chickens became sick. However, so did a group of chickens that were not injected with bacteria. One of the scientists, Dr. Eijkman, noticed something. Before the experiment, all the chickens had eaten whole-grain rice, but during the experiment, the chickens were fed polished rice. Dr. Eijkman researched this interesting case. he found that polished rice lacked thiamine, a vitamin necessary for good health.

How Penicillin Was Discovered

In 1928, Sir Alexander Fleming was studying Staphylococcus bacteria growing in culture dishes. He noticed that a mold called Penicillium was also growing in some of the dishes. A clear area existed around the mold because all the bacteria that had grown in this area had died. In the culture dishes without the mold, no clear areas were present. Fleming hypothesized that the mold must be producing a chemical that killed the bacteria. He decided to isolate this substance and test it to see if it would kill bacteria. Fleming transferred the mold to a nutrient broth solution. This solution contained all the materials the mold needed to grow. After the mold grew, he removed it from the nutrient broth. Fleming then added the nutrient broth in which the mold had grown to a culture of bacteria. He observed that the bacteria died.

6. Identify the problem.

7. What was Fleming's hypothesis?

8. How was the hypothesis tested?

9. Should the hypothesis be supported or rejected based on the experiment?

10. This experiment lead to the development of what major medical advancement?
Scenario: Floor Wax
A shopping mall wanted to determine whether the more expensive “Tough Stuff” floor wax was better than the cheaper “Steel Seal” floor wax at protecting its floor tiles against scratches. One liter of each brand of floor wax was applied to each of 5 test sections of the main hall of the mall. The test sections were all the same size and were covered with the same kind of tiles. Five (5) other test sections received no wax. After 3 weeks, the number of scratches in each of the test sections was counted.

1. What question are they trying to answer?
2. What is the hypothesis?
3. What variable did they change?
4. What parameters did they keep the same?
5. What is a good conclusion to the experiment?

Scenario: Brands of Car Wax
Jack wanted to test which brand of car wax was most effective. He tested four brands of wax. He cleaned the hood of his car and removed the old wax. He measured four equal sections on the hood of the car. Each of the waxes was used to cover a section. An equal amount of wax, the same type of rag, and equal buffing were used. Five drops of water were placed on each square, and the diameter of each drop was measured (cm) (quantitative). Jack could have used a qualitative dependent variable by developing a rating scale for amount of shine, from dull to very shiny.

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Scenario: Color of food
Gloria wanted to find out if the color of food would affect whether kindergarten children would select it for lunch. She put food coloring into 5 identical bowls of mashed potatoes. The colors were plain, red, green, yellow, and blue. Each child chose a scoop of potatoes of the color of their choice. Gloria did this experiment using 100 students. She recorded the number of students that chose each color.

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5. What is a good conclusion to the experiment?

Scenario: Heat insulation
Esther became interested in insulation while her parent’s new house was being built. She decided to determine which insulation transferred the least heat. She filled each of 5 jars half-full with water. She sealed each jar with a plastic lid. Then she wrapped each jar with a different kind of insulation. She put the jars outside in the direct sunlight. Later, she measured the temperature of the water in each jar.

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Scenario: Compost and Bean Plants

After learning about recycling, members of John’s biology class investigated the effect of various recycled products on plant growth. John’s lab group compared the effect of different-aged grass compost on bean plants. Three flats of bean plants (25 plants/flat) were grown for 5 days. The plants were then fertilized as follows: (a) Flat A: 450 g of 3-month-old compost, (b) Flat B: 450 g of 6 month-old compost, and (c) Flat C: 0 g compost. The plants received the same amount of sunlight and water each day. At the end of 30 days the group recorded the height of the plants (cm).

Results

<table>
<thead>
<tr>
<th>Height</th>
<th>3 month-old</th>
<th>6 month-old</th>
<th>No compost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Original height</td>
<td>5 inches</td>
<td>5 inches</td>
<td>5 inches</td>
</tr>
<tr>
<td>After 30 days</td>
<td>10 inches</td>
<td>8 inches</td>
<td>6 inches</td>
</tr>
</tbody>
</table>

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5. What is a good conclusion to the experiment?