8.SP.4 Music and Sports (has both reviews)

Alignment 1: 8.SP.A.4

Is there an association between whether a student plays a sport and whether he or she plays a musical instrument? To investigate these questions, each student in your class should answer the following two questions:

1. Do you play a sport? (yes or no)

2. Do you play a musical instrument? (yes or no)

Record the answers in the table below.

Student	Sport?	Musical Instrument?
1		
2		
3		
4		
5		
6		
7		
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11		
12		
13		
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17		
18		
19		
20		
21		
22		
23		
24		

a. Summarize the data into a clearly labeled table.

b. Of those students who play a sport, what proportion play a musical instrument?

c. Of those students who do not play a sport, what proportion play a musical instrument?

d. Based on the class data, do you think there is an association between playing a sport and playing an instrument?

e. Create a graph that would help visualize the association, if any, between playing a sport and playing a musical instrument.

Commentary:
- Vocal training maybe considered "playing a musical instrument."
- The most commonly used graph to display the relationship between two categorical variables is a segmented bar graph. For segmented bar graphs, we have the categories of the explanatory variable along the x-axis (i.e. horizontal axis), with a bar worth 100% at each category. Each bar is split into segments representing the categories of the response variable. The size of each segment is proportional to the conditional proportions of the categories of the response variable, within each category of the explanatory variable.

Solution: Solution

Solutions will vary depending on the actual data values collected by the class. Below is a solution based on the following hypothetical data set:

Student	Sport?	Musical Instrument?
1	Yes	No
2	Yes	No
3	Yes	No
4	No	No
5	No	Yes
6	Yes	Yes
7	No	Yes
8	Yes	No
9	No	Yes
10	Yes	Yes
11	Yes	No
12	Yes	Yes
13	Yes	No
14	No	No
15	No	Yes
16	Yes	Yes
17	Yes	No
18	Yes	No
19	No	Yes
20	Yes	Yes
21	Yes	Yes
22	No	Yes
23	No	No
24	No	Yes

a. The data can be summarized into a two-way table:

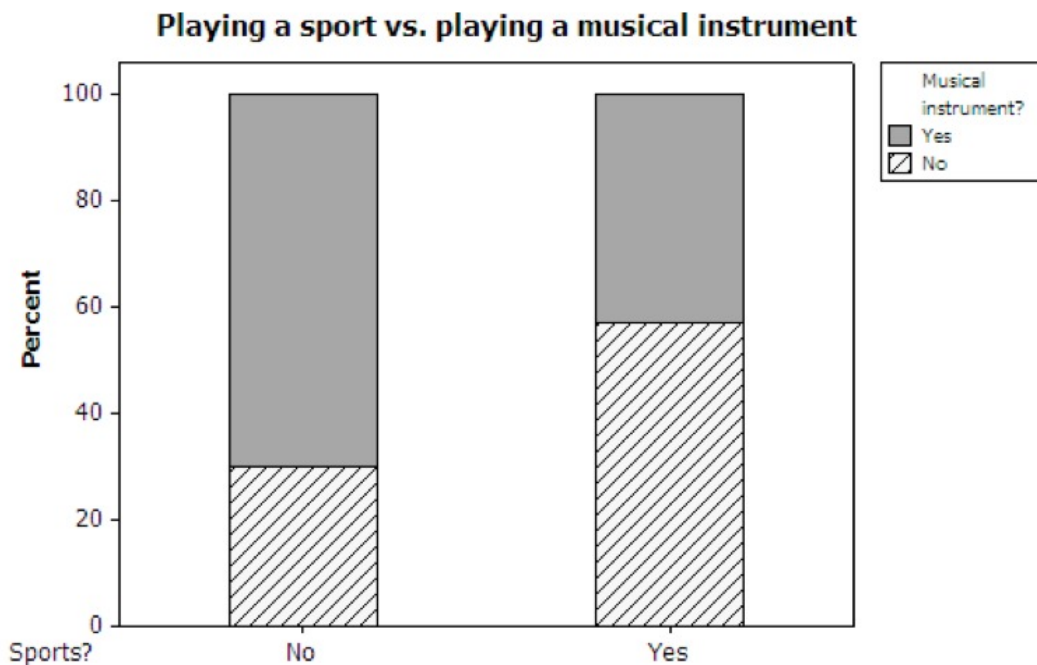|		Sports?		
		Yes	No	Total
Musical Instrument?	**Yes**	6	7	13
	No	8	3	11
	Total	14	10	24

b. Of those students who play a sport, the proportion who play a musical instrument = $\frac{6}{14} = 0.43$

c. Of those students who do not play a sport, the proportion who play a musical instrument = $\frac{7}{10} = 0.70$

d. Based on the above data, it appears that students who don't play a sport, are more likely to play a musical instrument

compared to students who do play a sport, as can be seen from the answers to (b) and (c).

e. Here is a segmented bar chart for the above data:

Playing a sport vs. playing a musical instrument

As can be seen from the above graph, of all those students who reported not playing a sport, 70% reported playing a musical instrument, whereas 30% reported not playing a musical instrument. On the other hand, of all those students who reported playing a sport, about 43% reported playing a musical instrument, compared to 57% reported not playing a musical instrument.