

Hands-on Activities...	Overall IP credit...	Total
5 1,1	1 1,2	6
4 2,1	5 2,2	9
5 3,1	4 3,2	9
Total	14	24

$$E_{ij} = \frac{\text{Row total} \cdot \text{column total}}{\text{Grand total}}$$

Expected data

$$E_{1,1} = \frac{6 \cdot 14}{24} = 3.5$$

$$E_{2,1} = \frac{9 \cdot 14}{24} = 5.25$$

$$E_{3,1} = \frac{9 \cdot 14}{24} = 5.25$$

$$E_{1,2} = \frac{6 \cdot 10}{24} = 2.5$$

$$E_{2,2} = \frac{9 \cdot 10}{24} = 3.75$$

$$E_{3,2} = \frac{9 \cdot 10}{24} = 3.75$$

$$\chi^2 = \sum \frac{(O_i - E_i)^2}{E_i}$$

$$\begin{aligned}\chi^2 &= \frac{(5 - 3.5)^2}{3.5} + \frac{(4 - 5.25)^2}{5.25} \\&+ \frac{(5 - 5.25)^2}{5.25} + \frac{(1 - 2.5)^2}{2.5} \\&+ \frac{(5 - 3.75)^2}{3.75} + \frac{(4 - 3.75)^2}{3.75} \\&= 2.285714286\end{aligned}$$

$$\text{degrees of freedom} = (\text{rows}-1) \cdot (\text{columns}-1)$$

$$df = (3-1) \cdot (2-1)$$

$$df = 2$$

$$p\text{-value} = P(\chi^2 > 2.285714286)$$

$$= 0.3189065573$$

rounded

$$\text{chosen significance level} = 0.001$$

Null hypothesis:

There is no relationship between hands-on activities ~~and overall school preference~~ and overall school preference.

Alternate hypothesis:

There is a relationship between hands-on activities and overall school preference.

Since at 0.001 significance level
the p-value of 0.3189065573 is
greater than the significance level,
then we fail to reject the null hypothesis.

Therefore, there is sufficient
evidence that there is no relationship
between hands on activities and
overall school preference.