

The Interpolated Median

In computing numerical summaries for student responses, the following scales are used:

5 = Strongly agree	5 = Excellent
4 = Agree	4 = Very good
3 = Neither agree nor disagree	3 = Good
2 = Disagree	2 = Fair
1 = Strongly disagree	1 = Poor

N/A responses are not included when computing summaries.

The *median* is the middle observation in a sorted list of data. Half of the values in the data set are less than or equal to the median and half are greater than or equal to it. The *interpolated median* (IM) which is included in this report adjusts the median slightly upward or downward.

For example, any interpolated median between 3.5 and 4.5 indicates that the actual median rating for the question was 4. An interpolated median between 4.0 and 4.5 also indicates that there were more ratings above 4 than below 4. Similarly, an interpolated median between 3.5 and 4.0 indicates that there were fewer ratings above 4 than below 4.

Why use an interpolated median?

To illustrate the usefulness of the interpolated median, consider two classes with 20 students in each class. The table below lists the number of students in each class that gave each response to a particular question on the course evaluation:

Response	Class 1	Class 2
5 = Strongly agree	9	1
4 = Agree	10	10
3 = Neither agree nor disagree	0	6
2 = Disagree	1	1
1 = Strongly disagree	0	2

Both class 1 and class 2 have medians of 4 for this question. However, it is quite clear that the overall ratings of class 1 were substantially better than class 2. The interpolated median provides a way to adjust the median to reflect this. The interpolated median for Class 1 is 4.4 (the median is adjusted upward since 9 students gave a rating above the median while only 1 gave a rating below the median). On the other hand, in Class 2, more students gave ratings below the median than above it, so the interpolated median adjusts downward to 3.6. The interpolated median clearly represents the differences in the two classes, while the median failed to do so.

How is the interpolated median actually computed?

Define variables as follows:

N = total number of valid responses to the question

M = the standard median of the scores

n_1 = number of scores less than M (strictly less, not equal)

n_2 = number of scores equal to M

The interpolated median IM is then computed as follows:

$$IM = \begin{cases} M & \text{if } n_2 = 0 \\ M - 0.5 + \frac{0.5N - n_1}{n_2} & \text{if } n_2 \neq 0 \end{cases}$$