

On the Calculation of eSET Median Scores

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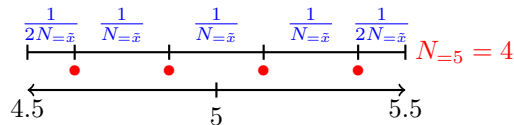
The Academic Programs, Assessment & Accreditation office provides a description of the eSET Median Calculation:

The median is the value on the score scale that separates the top half of the group from the bottom half. OSU uses a calculation that assumes that multiple values within a range are distributed evenly over the range. A calculation of this type results in a more complete set of values. The traditional computation of median might result in values of 5.0, 5.5, 6.0. The OSU calculation results in values 5.0, 5.1, 5.2, and so on to 6.0). This calculation has been used for OSU student evaluations since 2004. There is a good detailed explanation with examples on page 33 of [1].

We were unwilling to walk to the Valley Library, so we decided to reverse engineer the OSU eSET calculation based on its description quoted above, arriving at the following result

$$\tilde{x}_{eSET} = \tilde{x} - \frac{1}{2} + \frac{1}{2N_{=\tilde{x}}} + \frac{\frac{N+1}{2} - N_{<\tilde{x}} - 1}{N_{=\tilde{x}}} \quad (1)$$

where \tilde{x} is the traditional median, N is the number of responses, $N_{<\tilde{x}}$ is the number of responses less than the traditional median, and $N_{=\tilde{x}}$ is the number of responses equal to the traditional median. The basic idea is that occurrences are spread uniformly over an open interval centered at the score, as demonstrated below for four scores of 5.



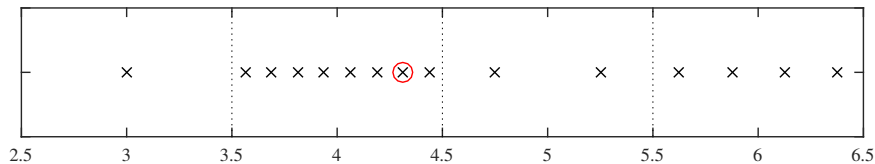
After dispersing all occurrences of scores 1 to 6 over the number line, the traditional median calculation is employed where the $((N + 1)/2)$ th value is chosen. An example data set and calculation are shown below.

Score	Number
3	1
4	8
5	2
6	4
	15

$$\tilde{x} = 4, N = 15, N_{=4} = 8, N_{<4} = 1$$

$$\tilde{x}_{eSET} = 4 - \frac{1}{2} + \frac{1}{2(8)} + \frac{\frac{15+1}{2} - 1 - 1}{8} = 4.3125 \quad (2)$$

For the given data, eSET reports a median score of 4.3, which is confirmed via the number line below where the $((N + 1)/2)$ th value, 4.3125, is circled.



One example is not exhaustive and we may have some minor errors in the equation that would lead to incorrect results for boundary cases; however, we are confident this gives a good idea of how medians are computed for eSET scores.

References

[1] Robert L. Thorndike and Elizabeth P. Hagen (1977). "Measurement and Evaluation in Psychology and Education", Oxford, Fourth Edition.