

# Wilcoxon Rank-Sum Test Report

## Wilcoxon Rank-Sum Test Analysis Report

Date: 2025-04-06

### Introduction

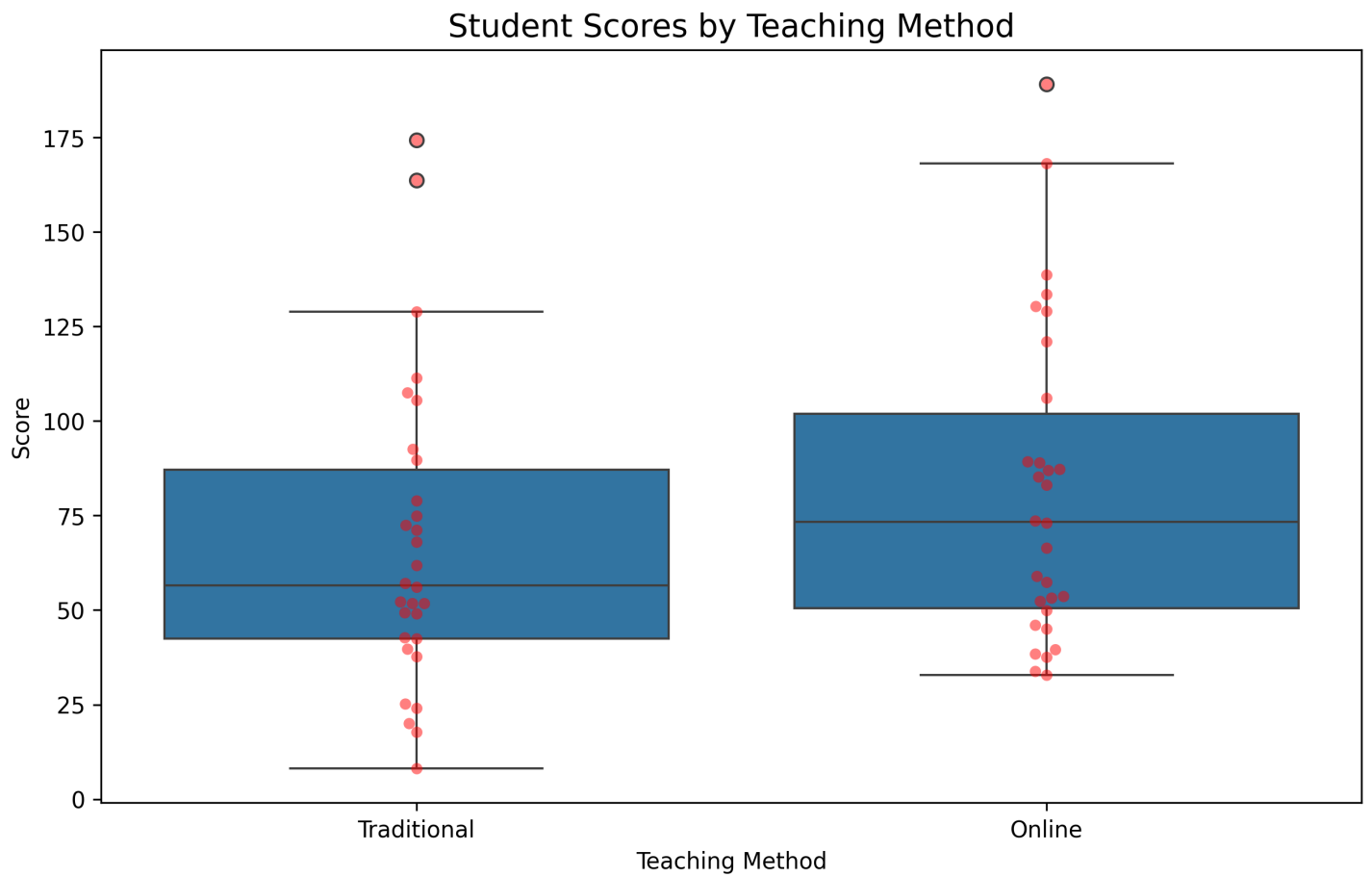
This report presents the results of a Wilcoxon rank-sum test (also known as the Mann-Whitney U test) comparing two independent groups. The test is a non-parametric alternative to the independent t-test, used when the assumption of normality is violated or when analyzing ordinal data.

### Data Description

The analysis includes data from 60 participants, divided into two groups: Traditional (n=30) and Online (n=30). The data represents student scores after being taught using different teaching methods.

Method	Mean	Median	Std Dev
Traditional	67.54	56.55	39.70
Online	81.63	73.32	40.72

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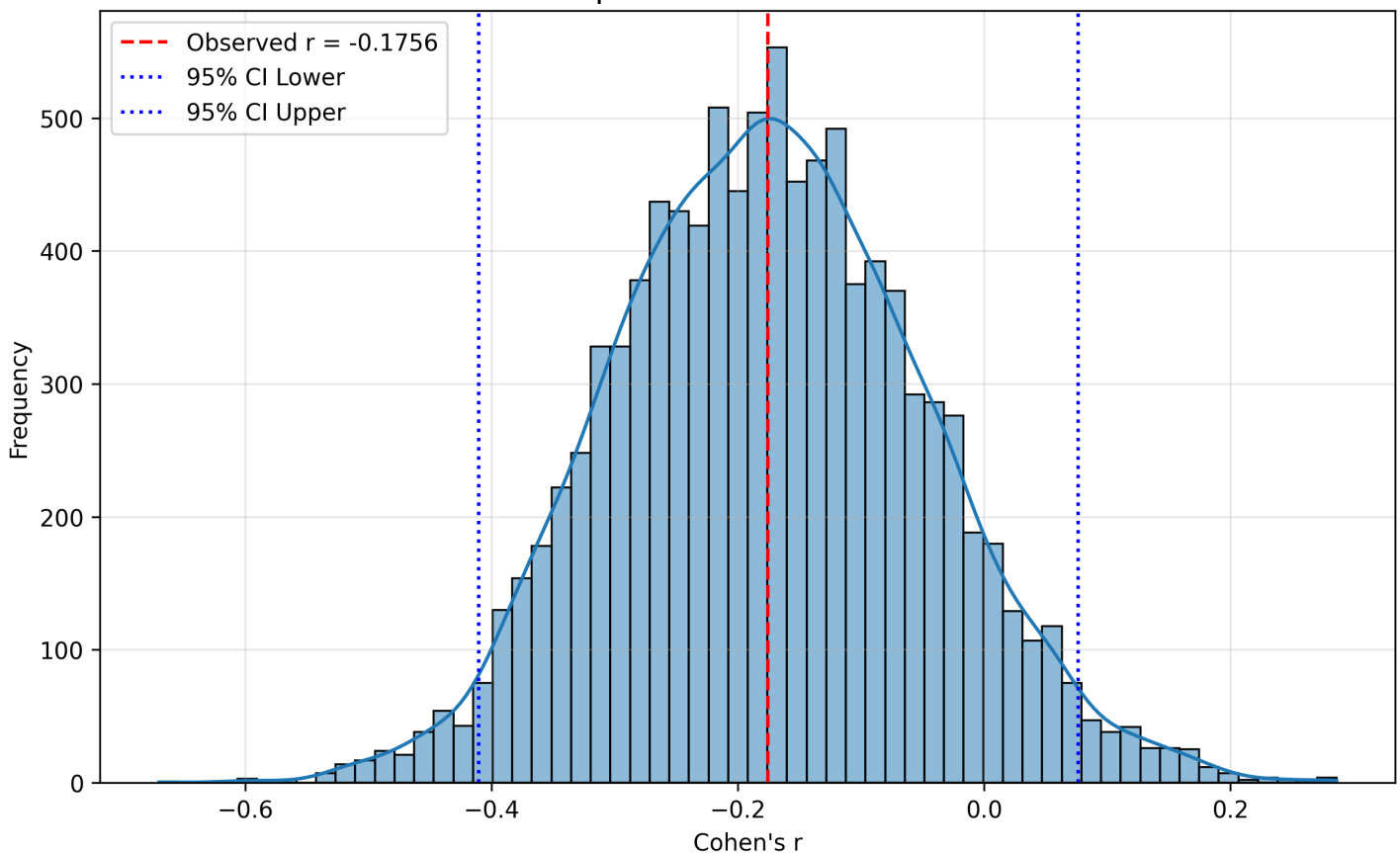
## Test Results

The Wilcoxon rank-sum test was performed to compare the scores between the Traditional and Online teaching methods. The results indicate a not statistically significant difference between the groups ( $U = 358.00$ ,  $p = 0.1761$ ).

## Effect Size

The effect size was calculated using Cohen's  $r$ , which is appropriate for non-parametric tests. The effect size is small ( $r = -0.1756$ , 95% CI:  $[-0.4104, 0.0763]$ ). This indicates the magnitude of the difference between the two teaching methods.

Bootstrap Distribution of Effect Size



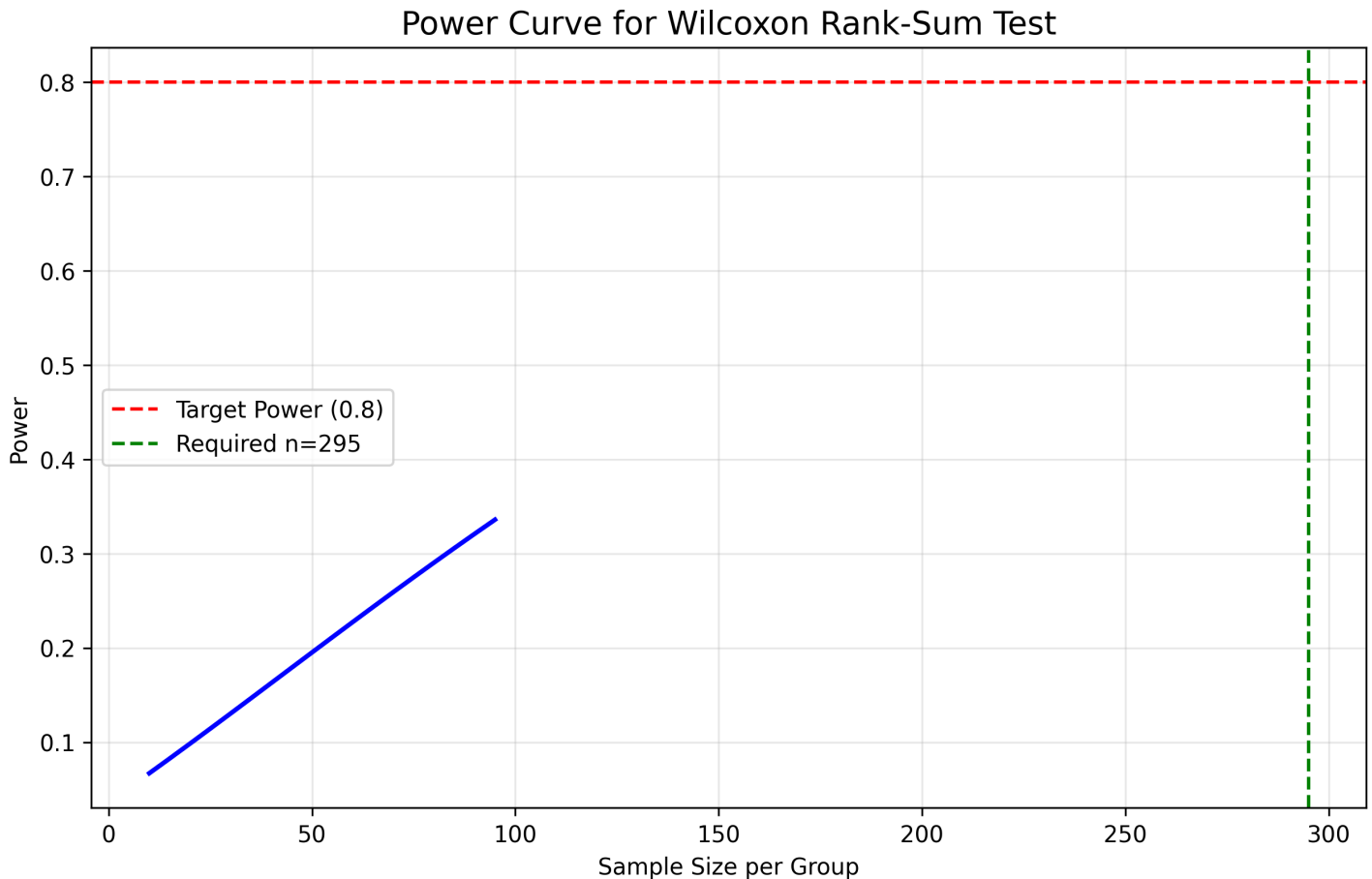
## Rank-biserial Correlation

The rank-biserial correlation ( $r_{rb} = 0.2044$ ) indicates the direction and magnitude of the difference between the two groups. A positive value suggests that the Online method is associated with higher ranks (better scores) compared to the Traditional method.

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## Power Analysis

A power analysis was conducted to determine the sample size required to achieve 80% power with the observed effect size. The results indicate that 295 participants per group would be needed to achieve this level of power. With the current sample size ( $n=30$  per group), the approximate power is 0.0671.



## Conclusion

Based on the Wilcoxon rank-sum test, there is a not statistically significant difference in student scores between the Traditional and Online teaching methods ( $p = 0.1761$ ).

The effect size is small (Cohen's  $r = -0.1756$ ), indicating the magnitude of this difference. The rank-biserial correlation ( $r_{rb} = 0.2044$ ) shows the direction of the difference, suggesting that the Online method is associated with higher scores.

To achieve 80% power with the observed effect size, 295 participants per group would be needed. The current study has approximately 0.0671 power to detect the observed effect size.