

## Case 18: Teaching Methods and Students Engagement Scores

A high school implemented three different teaching methods in their biology classes to improve student engagement. The study is carried out among 45 randomly selected students, who are then randomly divided into three groups of 15 each, each group receiving one of the following teaching methods: Traditional Lecture (Control), Project-Based Learning, and Flipped Classroom. The school measures student engagement through a standardized observation protocol that scores engagement on a scale from 0 to 100, as shown in Table 5.6. Engagement scores are collected over a six-week period, and trained observers rate student engagement using standardized criteria.

TABLE 5.6: Teaching Methods and Engagement Scores ([download data](#)).

Method	Score	Method	Score	Method	Score
Traditional	40	Project_Based	60	Flipped	50
Traditional	41	Project_Based	61	Flipped	51
Traditional	42	Project_Based	62	Flipped	52
Traditional	42	Project_Based	63	Flipped	53
Traditional	43	Project_Based	64	Flipped	54
Traditional	44	Project_Based	90	Flipped	55
Traditional	45	Project_Based	91	Flipped	56
Traditional	46	Project_Based	92	Flipped	57
Traditional	47	Project_Based	93	Flipped	58
Traditional	48	Project_Based	94	Flipped	60
Traditional	50	Project_Based	95	Flipped	65
Traditional	55	Project_Based	96	Flipped	75
Traditional	70	Project_Based	97	Flipped	85
Traditional	85	Project_Based	98	Flipped	90
Traditional	95	Project_Based	99	Flipped	95

The following are the research questions:

- Is there a significant difference in student engagement levels across the three teaching methods?
- Which teaching methods, if any, show significantly different levels of engagement?

**Initial Questions**

1. What are the research objectives?
2. What are the statistical questions?
3. What is the response variable, and what is the data type of the response variable?
4. What are the explanatory variables of interest?
5. Are there covariates?
6. What is the population of interest?
7. What is the subject, and what is the number of distinct subjects?
8. Are there subject-level data?
9. Are response variables dependent (repeated measures / clustered subjects)?
10. Are the subjects selected randomly?
11. Are the subjects randomly assigned to different groups?

**Initial Thoughts**