



# The Effects of Preliminary Discussion on Class Performance

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## Abstract

Our study aimed at focusing on the effects the discussions had on students. Previous studies have found that incorporating active discussion can help students with overall learning experience. We wanted to involve discussion amongst students so that students would communicate more efficiently as they started working together. We surveyed the students on their test scores and their belief in the effectiveness of the discussion. We used the Spring 2022 students as our experimental group and the Fall 2021 students as our control, in which we recorded exam scores across multiple disciplines. Our results showed that there is no significant evidence to conclude that there is a clear distinction from the Fall and Spring exam scores.

## Introduction

This model of active discussion has been shown to improve student outcomes in lower levels of education and in fields like psychology. If students can improve their learning outcomes using active discussion, it will significantly increase their ability to learn and study in multiple different ways instead only of relying on traditional study methods. However, not all discussion models have the same effect on student perception of teacher effectiveness. Some studies showed that students thought they learned less and the course and professor were less effective. Thus, classrooms that engage in active discussion should have teachers as guides to increase the effectiveness of the discussion.

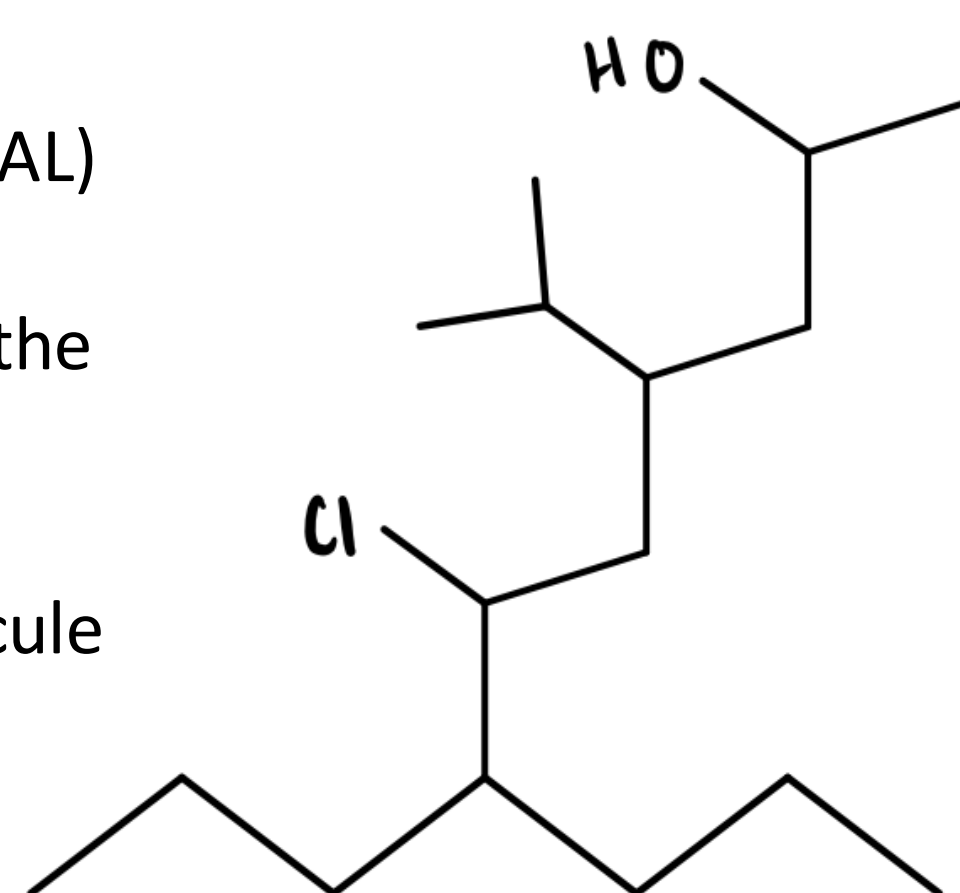
## Methods

The discussion was held at the beginning of each class session. Students were assigned two questions/problems from their respective subjects. The first of the two questions were fact-based at a surface level of knowledge and tested students on how well they retained the class material, and the second question was conceptually based and allowed students to apply their knowledge to a question that could not be solved simply by looking for a definition. The PAL facilitator gave the students 5-10 minutes of class time to allow students to solve these problems with each other in groups and the students were not allowed to look at class notes. During this discussion, the facilitator encouraged students to communicate with one another and agree upon an answer for each problem that was assigned. At the beginning of class, the PAL facilitator wrote both questions up on a whiteboard. At the end of the discussion time, the PAL facilitator then asked "What was the most difficult thing for you in these problems?"

Example: (For an Organic Chemistry PAL)

1) What are the essential features of the IUPAC naming system?

2) Give the IUPAC name for the molecule below.



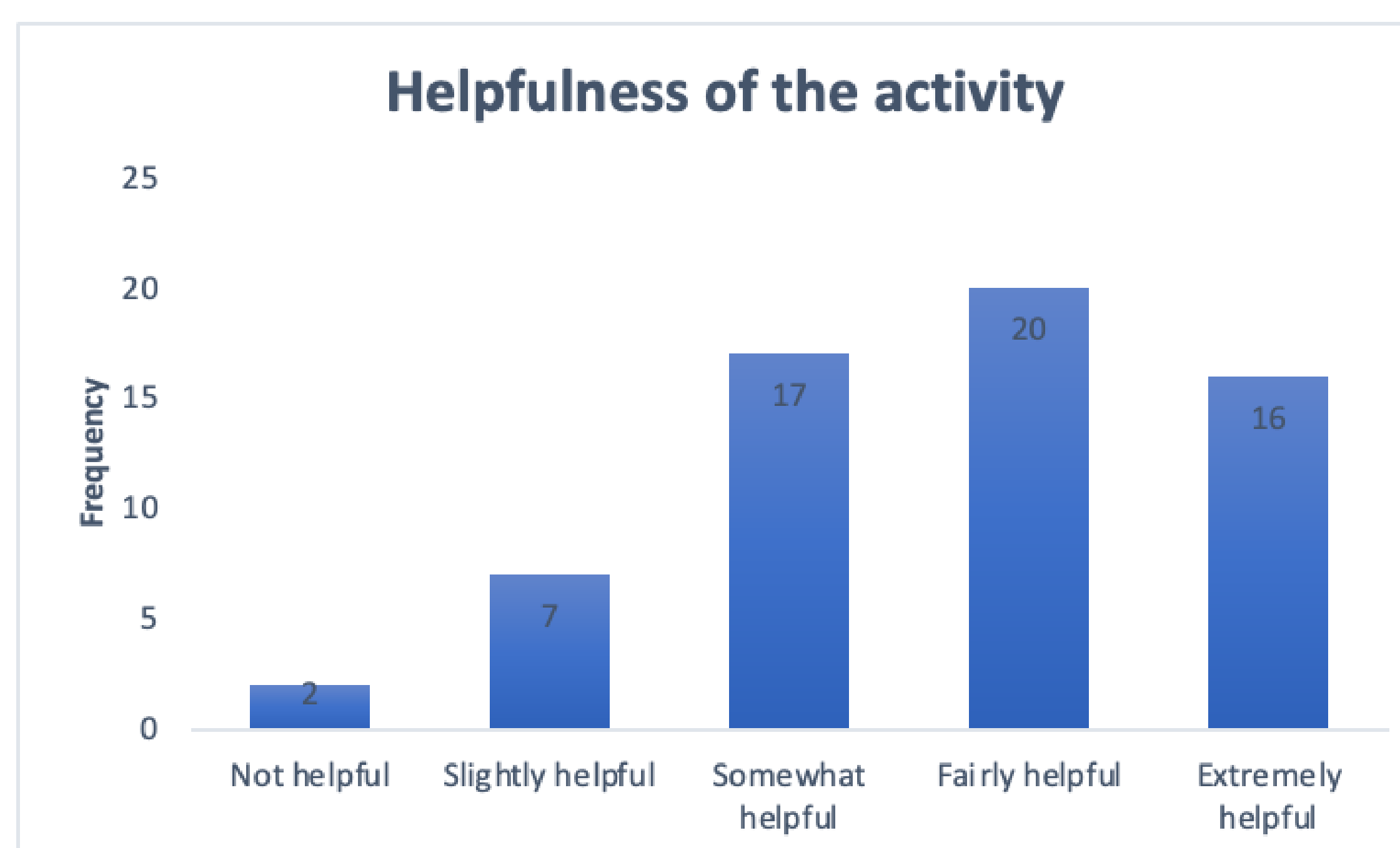
## Data Collection and Results

### Data Collection:

- To measure the impact of our intervention, we collected students' grades for each exam both in Fall 2021 and Spring 2022 through an anonymous survey.
- The survey also asks students to measure the quality of our discussion and to see students' perspectives on how the discussion helped them prepare for their exams on a 1-5 scale with 1 being unhelpful and 5 being extremely helpful.
- Survey were distributed after every exam

### Goal:

To determine whether our intervention led to grade improvement in Spring semester for students enrolled in PAL



**Figure 1:** This figure summarizes students' responses regarding how helpful the discussion was, on a scale of 1-5 (1 being not helpful and 5 being extremely helpful)

### Average Grade Comparison



**Figure 2:** Average grade point averages for tests taken during different semesters for various classes and overall.

### Analysis Result:

- Spring grades were compared to PAL students' grades collected in the fall as our control group.
- The average spring grade was observed to be lower compared to the fall grade in general.
- Shapiro-Wilk normality test was used to check the normality of the data
- There was a significant difference between the grades of students in Spring semester PAL ( $M=76.13$ ;  $SD=17.62$ ), and students in Fall semester PAL ( $M=81.18$ ;  $SD=12.6$ ) across all subjects, with  $p=0.04$ .
- There was not a significant difference observed when comparing the means of grades in Chemistry using the Mann-Whitney U test ( $p=0.15$ ).
- Using a two-sample t-test assuming unequal variances, there was not a significant difference observed in Math grades ( $p=0.07$ ).
- A significant difference was observed for Physics grade, with  $p=0.04$ .
- Students found the discussion to be beneficial. (Figure 1)

## Discussion

The sample size of students in the two different semesters, the classes being online last semester and in person, alternative styles of student learning, various professors, different PAL facilitators for each course, and having online exams in the fall and mostly in person exams in the spring are some limitations that could have influenced our results. However, because the chemistry class also featured online exams during the spring semester, this could be one of the reasons we have a higher mean for the spring semester compared to the fall semester. Considerations that should be investigated include the effect of the environment on the authenticity of the data. Last semester (Fall), data was collected through remote learning, however this semester (Spring), the bulk of classes conducted in-person exams.

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## References

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