

# THE INTERNATIONAL JOURNAL OF HUMANITIES & SOCIAL STUDIES

## Instruction Improvement Based on Flipped Classroom Method

Hwang, Jing-yi

Lecturer, Department of Applied English,  
I-Shou University, Taiwan

### Abstract:

*Students' in-class participation is an important key to the success of instruction for English conversation course. In order to enhance the instruction of English conversation classes, this study implements 'performance mark' system which intends to encourage students to participate the in-class activities during the semester. Taking advantages of flipped classroom principles, linear regression and statistics, this study applies the system onto 183 sample students. The data collected through the three tests are gathered and carefully scrutinized. Not only the results indicate that the 'performance mark' system improves the grades of the students, but also it demonstrates a scheme for general instructors in how to enhance the effectiveness of teaching in English conversation course.*

**Keywords:** In-class discussion, English conversation teaching, linear regression, flipped classroom

### 1. Introduction

English language teaching has been promoted in Taiwan for decades. However, even though most students have learned English for years, the general students still cannot read, write, comprehend or speak English efficiently<sup>1,2</sup>. Therefore, the English conversation course is required for all freshmen in all majors. The course requires students to proactively participate in the in-class activities during class hours to gain English conversation capability effectively. However, on average, students tend to flinch and sit back in the classroom.

This study takes advantage of flipped classroom principles. This study implements a scheme that promotes students' willingness to participate in in-class activities. By encouraging in-class communication among students, the instructor intends to promote students' learning efficiency in the English conversation classes. The effectiveness of the in-class communication will be evaluated by the outcomes of the three tests given in the same semester.

Not only is the flipped classroom method implemented in the research, but the linear regression method and statistical histogram method<sup>3,4</sup> are introduced to see through the massive data<sup>5,6</sup>. Some interesting discoveries are disclosed in this paper, and practical suggestions are made accordingly.

### 2. Performance Mark System

The study covers 183 effective student samples that major in artificial intelligence, Chinese literature, applied arts, and management. Since English language or English literature is not their major, it makes the instruction harder for the instructor since English is not their major concern. Thus, promoting learning motivation turns out to be very important.

This study suggests a mechanism based on the concept of flipped classroom<sup>7,8,9</sup>. The principles include<sup>10</sup>:

- The students must finish reading the assigned readings each time before they attend the next class section.
- In the English conversation classes, students are strongly encouraged to share what they have read and learned from the assigned readings during class hours.
- When the student shares what he or she learned from the assigned readings, the rest are encouraged to proactively respond to the speech student<sup>11</sup>.
- The participation will be recorded according to how many times each student shares in class during the semester.
- The participation will be recorded according to how often each student proactively responds to other students who share speeches.
- All the in-class conversations are required to be done in English.

### 3. Data Acquisition

Each of the 183 students is denoted as sample  $S_i$  where  $i \in \{1, 2, \dots, 183\}$ . Each test of the three tests is denoted as  $T_j$  where  $j \in \{1, 2, 3\}$ . The mark obtained by student  $S_i$  in test  $T_j$  is denoted by  $x_{i,j}$ . Then  $x_{i,j}$ s are shown in Figure 1. The instructor monitors the in-class performance of each student and gives a 'performance mark,' i.e.,  $p_i$  where  $i \in \{1, 2, \dots, 183\}$ , according to the performance of the student each time when the student participates either in sharing what he learned from the assigned readings or in responding to the speeches delivered by other students. By analyzing the

correlations between the performance mark  $p_i$  and the marks of the three tests  $x_{i,j}$ , the author can grasp whether the 'performance mark' system works as suggested.

Figure 1 displays the marks of the three tests for each of the 183 students. Figure 2 shows the performance marks gained by the 183 students. Figure 3 displays the histograms of the marks for each student in tests no. 1, no. 2, and no. 3. Figure 4 demonstrates the normal distribution curves of the three histogram plots.

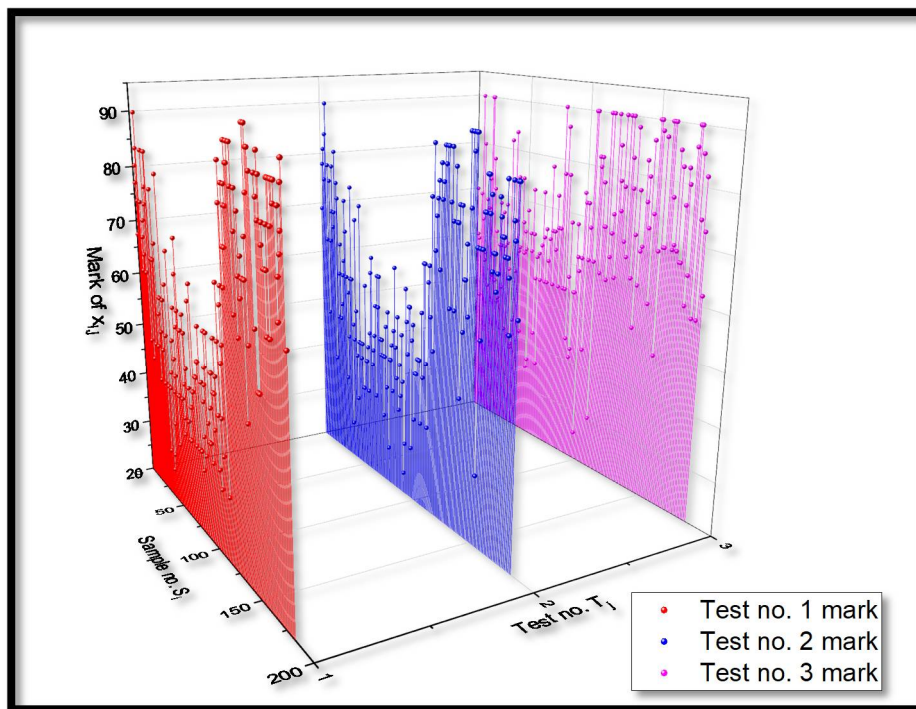


Figure 1: Marks of Three Tests of All the Students,  $x_{ij}$

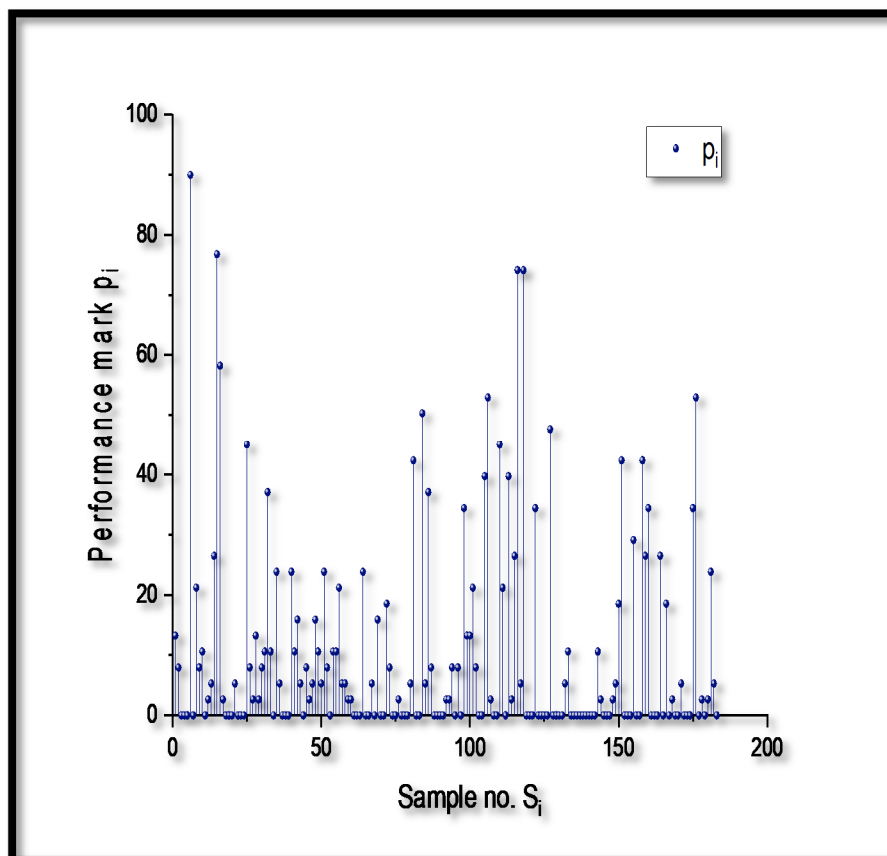


Figure 2: Performance Marks of Each Sample,  $p_i$

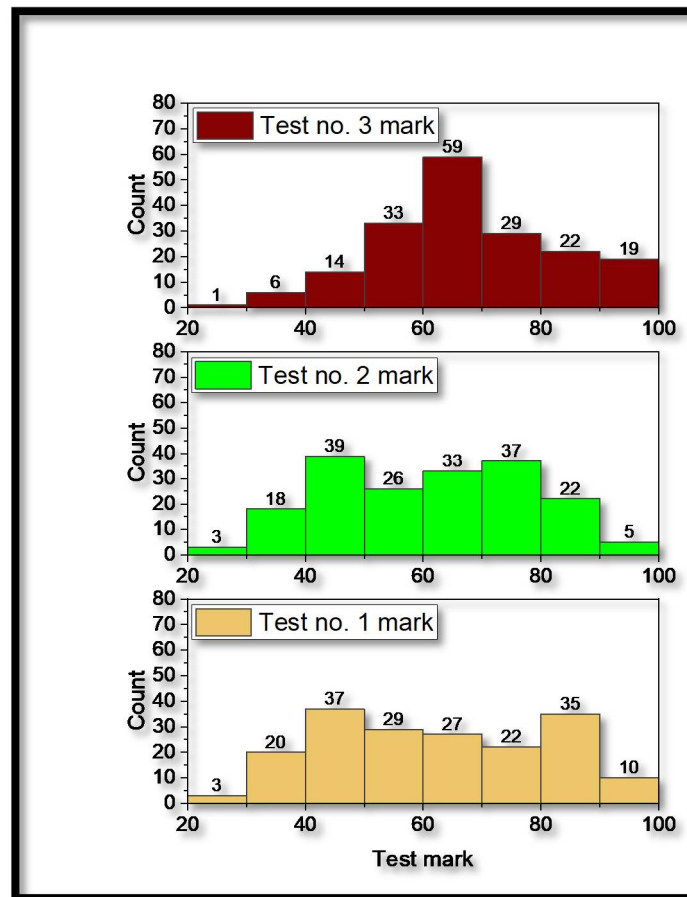


Figure 3: Histograms of the Three Tests. (A.) Top: Mark Histogram of Test No. 3, (B.) Middle: Mark Histogram of Test No. 2, and (C.) Bottom: Mark Histogram of Test No. 1

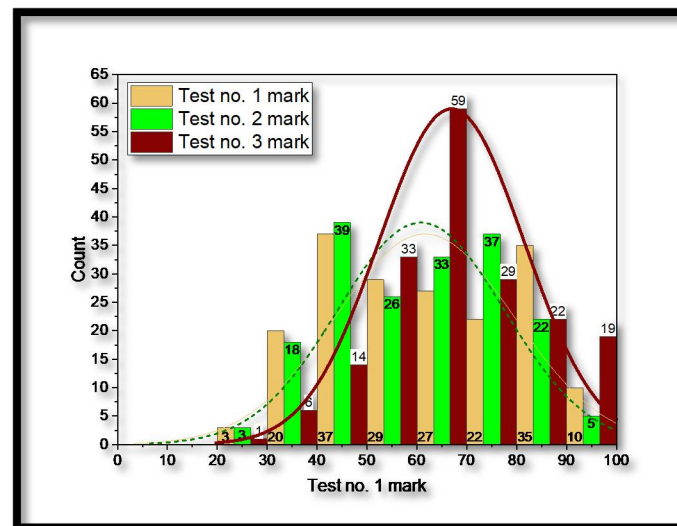


Figure 4: Histogram Normal Distribution Curves of the Three Tests

#### 4. Monitoring Students' Progresses

Out of the 183 students, 84 students never engaged in sharing what they read or responding to speeches made by other students. Thus, their  $p_i = 0$ . Let us categorize them in the 'not participated' group. The rest 99 students are categorized in the 'participated' group.

This study adopts linear regression to monitor if students progress through the three tests during the semester. Each sample  $S_i$  has three test marks (test no. 1,  $x_{i,1}$ ), (test no. 2,  $x_{i,2}$ ), and (test no. 3,  $x_{i,3}$ ). The slope of the regressed line, i.e.,  $m_i$ , can be obtained accordingly for sample  $S_i$ . When  $m_i > 0$ , it indicates student  $S_i$  makes progress. When  $m_i \leq 0$ , student  $S_i$  makes no progress. In Figure 5, 110 students make progress, and 73 students make no progress. See Table 1.

| Progress index                  | Count of participated samples | Count of not participated samples |
|---------------------------------|-------------------------------|-----------------------------------|
| Progressed ( $m_i > 0$ )        | Case A: 73                    | Case B: 26                        |
| Not progressed ( $m_i \leq 0$ ) | Case C: 37                    | Case D: 47                        |

Table 1: Progress Analysis vs. Participation

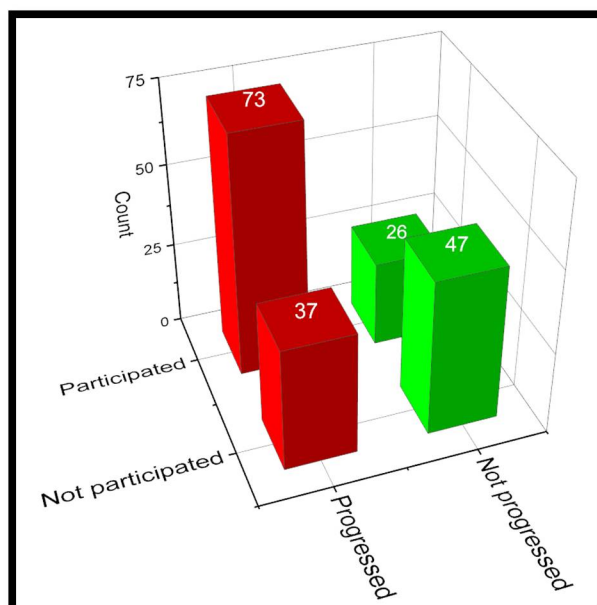


Figure 5: Progress Analysis with Respect to Participation

## 5. Observations

There are 183 student samples. Each sample comes with 3 test marks. So, there are 549  $x_{i,j}$ s. This chapter looks into the  $x_{i,j}$ s and studies various histograms and standard distribution curves to tell the information carried by  $x_{i,j}$ s. We have observed the following phenomena.

- According to the bottom and middle histogram plots in Figure 3, the mark distributions of tests  $T_1$  and  $T_2$  remain unchanged. However, the changes emerge in test  $T_3$ . See the top plot in Figure 3. The number of students whose marks range between 60 and 69 is increased from 33 to 59. Please compare the top histogram to the middle one in Figure 3.
- Also, the number of students whose marks range between 90 and 100 is increased from 5 to 19. See the top and middle plots in Figure 3.
- Normal distribution curve gives a clear perception of where the majority of marks gather and what intensity it carries. In Figure 4, the thin solid line represents the normal distribution curve of  $T_1$ , which centers around mark 62 with a count of 36. The dashed line represents the normal distribution curve of  $T_2$ , which centers around mark 61 with a count of 40. The bold solid line represents the normal distribution of  $T_3$ , which centers around mark 67 with a count of 60. The phenomenon indicates that the mechanism of the 'performance mark' system reshapes the normal distribution of the students' marks in three consequential tests. As a result, the system improves the overall performance of the 183 students through the three tests.
- In Figure 5, we can tell how effectively the 'performance mark' system works in helping students improve their English conversation learning. Out of 183 students, 73 students proactively participate in the 'performance mark' system and make progress, i.e.,  $m_i > 0$ , through the three tests. On the other hand, 47 students decline the 'performance mark' system and make no progresses, i.e.,  $m_i \leq 0$ . The former outnumber the latter. The 'performance mark' system can effectively enhance English conversation class teaching.

## 6. Conclusions

In order to effectively enhance English conversation learning, students must proactively participate in the activities suggested and given in the classes. Therefore, this study proposes a 'performance mark' system and applies it to four English conversation classes during the fall semester of 2021. According to items A and B in the above section, it is obvious that the 'performance mark' system increases the number of students who pass the course of English conversation through the three tests.

According to item C, the 'performance mark' system shifts the center of the normal distribution curve to a higher-grade level. In addition, it indicates that the 'performance mark' system enhances the students' learning status by encouraging most students in the four classes to participate in the in-class activities.

Item D in the above section reveals one interesting observation. Case A stands for those students who participate in the in-class activities, i.e., 'the performance mark' system. Case D stands for those who decide not to. Out of the four cases in Figure 5, Case A outnumbers the four groups, and Case D follows Case A. It indicates that the 'performance mark'

system is crucial if a student is determined to enhance his English conversation level. Those who take part in the system improve their grades. Those who decide not to participate in the system retrogress their grades.

Through this study, it is evident that the suggested 'performance mark' system can effectively improve the learning status of English conversation for non-English major students.

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