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EFL University Students English Listening Comprehension Incentive Assignment Analyzed by Standard Process Control Techniques

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Abstract:

An incentive assignment is built alongside an English listening comprehension course which is given to a group of non-English major students. To evaluate how effective the incentive assignment might be. The Standard Process Control (SPC) techniques are introduced. SPC plays as the major tool in analyzing test scores, which are overwhelming in quantity, obtained from four exams throughout the academic year. SPC is extensively applied in various manufacturing industries. It helps decision-makers spot the undesired occurrences in production lines. This study attempts to introduce SPC into English teaching and demonstrates how it may be used in assisting teaching, particularly in peering into the large amount of test score data. The timely analysis done by SPC gives instructors a stronger grip on the class and guides the entire class to a successful academic achievement.

Keywords: *English teaching, standard process control*

1. Introduction

According to the researcher's English teaching and language learning experience and ESL and EFL listening literature review, most students in Taiwan, particularly those whose majors are not exactly in English Literature, have shown difficulties in overcoming the barricade of listening comprehension in English classes. "It is simply that their inability to interact meaningfully with print text precludes their ability to respond critically, yet these same students come alive during a film study," (Smilanich & Lafreniere, 2010). Research in second language acquisition (SLA) has show that if learning is to be effective and permanent it must be meaningful, involve active mental processes, and be reliable with the existing knowledge in the learner's mind (Hanley, Herron, & Cole, 1995). At the center of Vanderplank's study (1988) on the merits of teletext subtitles for students learning English a second language: "...subtitles might have potential value in helping the language-acquisition process (as defined by Krashen, 1981), by providing language learners with the key to massive quantities of authentic and comprehensible language input" (p. 272-3). In Neuman and Loshkinen (1992), they concluded that "through captioned television, bilingual students appeared to make significant gains in vocabulary knowledge without any formal instruction" (p. 102). Williams & Thorne's (2000) suggest that subtitling training may provide a motivating form of study for students which will encourage them to invest long hours in mastering a foreign language while simultaneously gaining other valuable skills.

Apart from un-tuned ears, students may also lack motivation in dealing with the courses seriously as expected. How teachers can enhance learning and monitor the progress of each student turns out to be the primary focus of this study.

An incentive assignment is infused within the English Listening Comprehension course spanning from August 2012 to June 2013 at I-Shou University. The English Listening Comprehension course is a required course and is given to two classes of non-English-majored students. Participants in this research watched hour-long films with subtitles in English at the Learning center of the Library at their own time. Once a movie is watched, one incentive point is added onto his/her final grade. Four General English Proficiency Tests¹ (GEPT) are given in order to evaluate the progress of the students and the grades are collected. The large amount of data usually leaves a teacher at a loss of what to do. Thus Standard Process Control (SPC) is introduced in order to crack the data.

SPC is a tool commonly adopted in factories equipped with many production lines. It monitors the manufacturing processes, and by using the techniques of statistics, it spots odd occurrences during manufacturing. Thus, management can avert the flawed parameters residing in the production line in a timely manner and avoid further quality breach. The classroom, of course, is not a production line. However SPC can give some insightful information to assist a teacher to get a better grip on how successful the students have been in listening comprehension.

2. Methods

As long as a student, who is not exactly successful in the class, feels the need to improve his listening comprehension ability, he/she may go and watch the movies at his/her own free time, and the student is rewarded by one incentive point in his/her grade of in-class performance each time he/she completes a movie. Four GEPT tests were given during the entire academic year not only to monitor the progress of students but also to evaluate if the incentive program is doing the job or not.

Success is based on the rate of student’s progress in consecutive tests instead of how high he/she can score in each test. The incentive assignment aims to encourage less-prepared students to progress, thus the slope between two consecutive test scores is much more meaningful than the test result scores themselves. Therefore, define the three slopes of score as $m_i^1 = \frac{(s_i^2 - s_i^1)}{(2-1)}$, $m_i^2 = \frac{(s_i^3 - s_i^2)}{(3-2)}$, and $m_i^3 = \frac{(s_i^4 - s_i^3)}{(4-3)}$ where s_i^k is the GEPT score of the $i - th$ student in the first test, and so on. The numbers in denominators stand for the indexes of the four tests. The overall progress of the $i - th$ students is evaluated by linearly regressing the four test scores. Positive slope of the liner regression line implies that the student is making progress, and negative slope suggests the incentive program does not influence the student. By observing the distribution which is grouped according to the m_i^1 slopes and prepared by SPC, the teacher can tell immediately on how many students are progressing and regressing from test 1 to test 2.

At the end of the academic year, the four grades of each student are linearly regressed and the overall slope m_i^* is approximated as follows. The linear regression line is: $y = m_i^*x + c_i^*$ where

$$m_i^* = \frac{a_{22}z_1 - a_{12}z_2}{a_{11}a_{22} - a_{12}a_{21}}, \quad c_i^* = \frac{a_{11}z_2 - a_{21}z_1}{a_{11}a_{22} - a_{12}a_{21}}, \tag{1}, (2)$$

$$z_1 = \sum_{k=1}^4 k \cdot s_i^k, \quad z_2 = \sum_{k=1}^4 s_i^k, \tag{3}, (4)$$

$$a_{11} = \sum_{k=1}^4 k^2, \quad a_{12} = a_{21} = \sum_{k=1}^4 k, \quad \text{and} \quad a_{22} = \sum_{k=1}^4 1. \tag{5}, (6), (7)$$

3. Results and Observations

On the first days of the two classes, the incentive assignment was fully explained to 72 students majoring in information management, electronic communications, and chemical engineering. In order to validate the effect of the incentive assignment, the four GEPT test problems are generated by computer and the difficulties of the four individual tests are maintained at the same level. The grades are collected. The histograms in Figure 1 show the number of student in each grade scale with respect to Tests No. 1, 2, 3 and 4.

Although Figure 1 faithfully portrays the head counts of students whose grades fall in respective ranges of grade scale in each test, it does not tell how the incentive assignment is relevant to the grades. A teacher is still left helpless in cracking the colossal amount of score data. Thus, as proposed in the Introduction section, the slopes of score of each student between two consecutive tests are delved into.

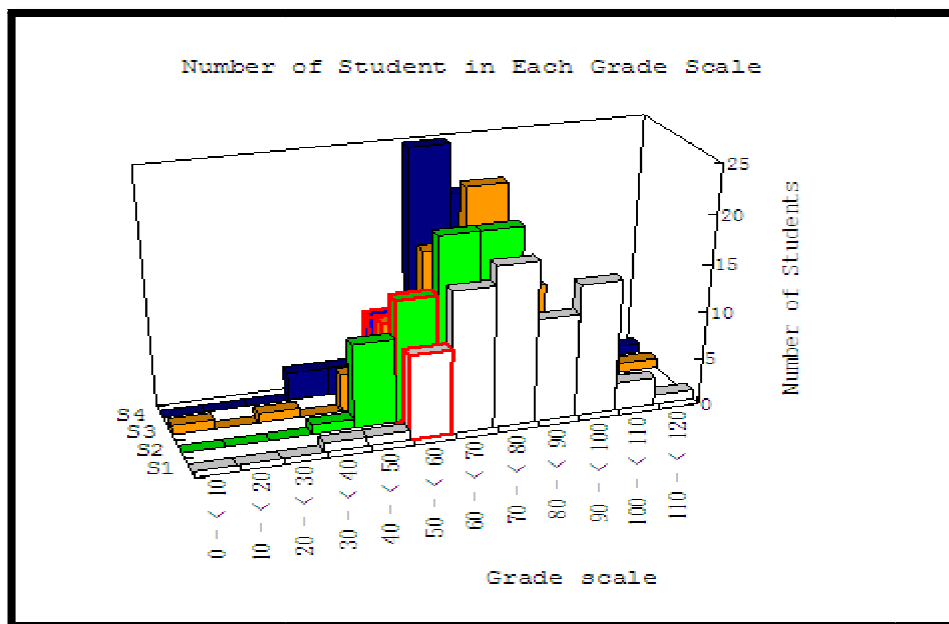


Figure 1: Histogram: Number of Student against Grade Scale of Tests 1, 2, 3 And 4

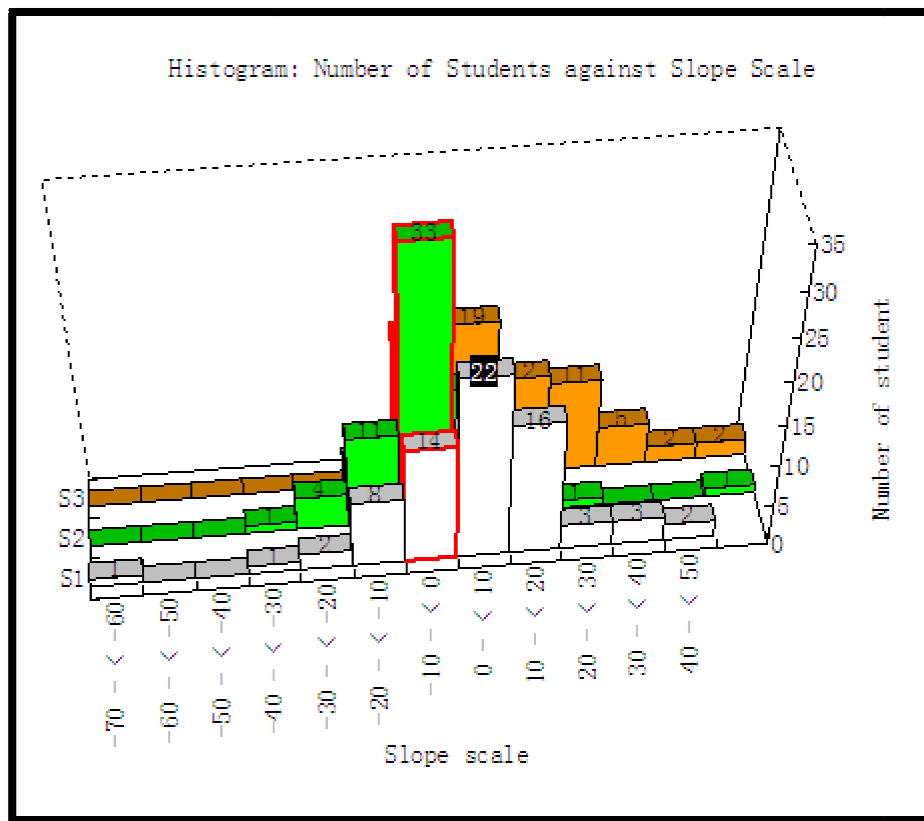


Figure 2: Histogram: Number of Students Against Slope Scale

There are three series in Figure 2. We will focus on Slope Series 1(S1). The highlighted number 22 in Series 1 (S1) indicates that there are 22 students whose scores improved by n points from Test 1 to Test 2 where $0 \leq n < 10$. A few observations are made out of Figure 2:

- The incentive assignment claims an initial triumph. 46 out of 72 students are making progress from Test 1 to Test 2. See Table 1.
- There are only 23 out of 72 students who made progress from Test 2 to Test 3.
- 33 students falling into the category of " $-10 \leq n < 0$ " in Series 2 is noticed. It is a significant drawback from Test 2 to Test 3.
- The center of distribution subject to Series 3 drifts back to the positive side of the slope scale.
- There are 51 out of 72 students marking progress from Test 3 to Test 4.

	No. of Progressing Student (with Positive Slope)	No. of Regressing Student (with Negative Slope)
From Test 1 to Test 2	46	26
From Test 2 to Test 3	23	49
From Test 3 to Test 4	51	21

Table 1: Headcounts of Progressing and Regressing Students

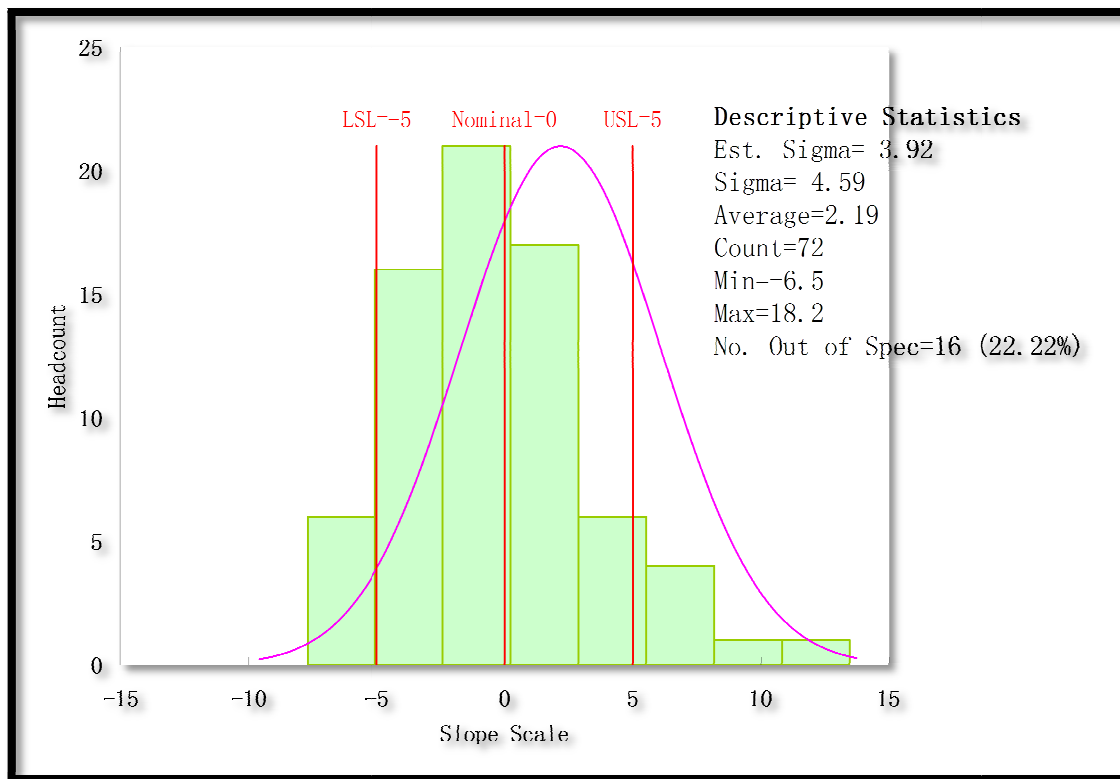


Figure 3: Histogram: Headcounts of the Overall Regressed Slopes of Each Student

Figure 2 interprets the individual slope histograms of Tests 1, 2 and 3. Figure 3 lays out the overall slope histogram. The four test scores of each student are linearly regressed and the slope is obtained by (1). The 72 slope values are presented in a histogram. See Figure 3. The averaged slope of the 72 students is 2.19 which is found by

$$m^{\dagger} = \frac{1}{72} \sum_{i=1}^{72} m_i^* \quad (8)$$

meaning during the academic year of 2012 the entire two classes progressed by 2.19 points. A few more observations are drawn accordingly.

- The overall slope m^{\dagger} in (8) appears to be positive which partly indicates the learning is successful.
- However $m^{\dagger} = 2.19$ means the two classes take the entire year to progress merely by 2.19 points. The value seems too slim and should have been better if the winter break downslope can be avoided.

4. Analysis

The incentive assignment aims to encourage students and enhance their English listening comprehension abilities. This study would like to seek evidences that justify the incentive assignment as being a benefit for students' ability to learn.

- According to Items 1 and 2 in Part III, there is no strong evidence to claim that the incentive assignment is taking effect even 46 out of 72 students are making progress.
- A drawback follows after the students come back from their winter break in February 2013. The winter break spans over the Chinese New Year holidays which provides an excuse for students to sit-back from their study plan. There is only one third of the students making progress from Test 2 to Test 3. However, if looked more closely, Figure 2 also points out that most of the non-progressing students fall in the slope scale of " $-10 \leq n < 0$ ", meaning that the particular group that fallbacks possibly aroused because of the winter break sitting-back and cannot be permanent nor too deeply rooted.
- The teacher notices the drawback identified by SPC and hence immediately promotes the incentive assignment to the two classes again, the result is dramatic. According to Items 4 and 5, 51 students claim progresses after they complete Test 4. The difference is merely the re-emphasis of the incentive program at the right timing. In order to avert the grade score to decrease, students become willing and motivated to carry out self-study, i.e., to participate in the incentive assignment at their own time.

5. Conclusions

There are two major ideas brought up in this study. The first one is if and how an incentive assignment helps teachers monitor their students' progress in his/her class. The second one is to exercise the power of SPC techniques so that an industry engineering tool can be applied to English teaching in a manner of cross-disciplines.

According to Item B in Part IV, students' progress fluctuates down due to the winter break. However the incentive assignment actually increases their grade score and averts the opposite. See Item C in Part IV.

In order to effectively monitor the progress of students in classes, a teacher should eventually look into the slopes between any two consecutive tests of each student, instead of individual grades. Continual self-motivated studying is actually the purpose of education. A positive slope in test score obviously means the student is progressing. See Figure 2 and Figure 3.

In this study, there are 288 test scores. They do not come out all at once, instead, the data arrives at four sporadic times during the academic year of 2012. The huge amount of data would ensnare a teacher from extracting meaningful information from the test scores, let alone responding timely when volleys of data loom up. SPC does a great job in handling large amount of data and respond to the teacher with a graphical summary. Without applying SPC techniques, the teacher may not be able to capture the drawback mentioned in Item B of Part IV, and would therefore miss the opportunity to infuse the incentive program to avert the back-slide of grades. See Part IV and Figure 2.

English teaching assisted with Standard Process Control Techniques not only provides a teacher with a solution to crack the data, but also facilitates the teacher with a scientific approach to better navigate the learning dynamics in the classroom.

6. References

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ⁱ The General English Proficiency Test (GEPT), developed and administered by the Language Training and Testing Center, targets English learners at all levels in Taiwan.