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Correlation Analysis between Scores of English and Other Subjects in Senior High Based on SPSS

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Abstract: *SPSS serves as an indispensable tool in the statistical analysis of English teaching test. With the assistance of SPSS 26.0, this paper will explore whether a correlation exists between high school students' English scores and total scores as well as scores of other subjects. The real scores of 43 students who participated in a large-scale examination of a high school in Zhejiang Province are extracted as the statistical data source, and the relevant data are employed for empirical analysis, in an effect to illuminate the correlation between English scores and other subjects in senior high school.*

Keywords: *SPSS; high school English scores; correlation analysis; test statistics*

1. Introduction

The full name of SPSS is Statistical Program for Social Sciences. As a statistical analysis tool, SPSS has diversified functions and characteristics such as rigorous theory, rich content, data management, statistical analysis, tabulation and drawing, thus it is universally hailed as one of the best statistical analysis software packages.[1] With the mushrooming advancement of computers and the burgeoning proliferation of software, SPSS exerts a sweeping influence in the field of statistical analysis of teaching test. Besides, strengthening data excavating and statistical analysis of test results are essential means to promote the scientific and standardized college entrance examination in the new era.[2] Consequently, the data obtained based on SPSS analysis not only straightforwardly indicate the relationship between various disciplines, but also play a certain role in spurring the innovation of teaching methods and contents as well as strengthening instructors' teaching capability across the country.

The English Curriculum Standards for Compulsory Education (2022 edition) explicitly elucidate that English is a pervasively used language in economic, political, scientific, technological, cultural and other activities around the globe nowadays, thereby playing a pivotal role in China's engagement with the world, the world's understanding of China, and the building of a community with a shared future for mankind. [3] Therefore, English subject occupies a significant position in all grades. In the meantime, one of the remarkable features of the new round of curriculum reform in China is to endeavor to break through the subject-centered view of curriculum, strengthen the integration of disciplines and establish comprehensive curriculum.[4] Hence, how to boost the integration and intersection between English and other subjects and avert the independence or disconnection between subjects are worth contemplating and delving into for English teachers in contemporary era. In view of the relationship between English and other subjects, this paper analyzes the correlation between scores of English and other subjects under the auspices of SPSS.

2. Research design

In this study, the final scores of 43 students in a class of senior one of an ordinary high school in Wenzhou of Zhejiang Province are extracted as the research object, and SPSS is used to analyze the data, in a bid to figure out following two questions.

2.1 Research questions

(1) What is the correlation between students' English scores and their total scores?

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(2) What is the correlation between students' English scores and their scores in other subjects?

2.2 Research Object

The object of this study derives from a common class of an ordinary middle school in Wenzhou of Zhejiang Province. Besides, the class consists of 43 students. The author has obtained the scores of nine subjects in a formal examination in the second semester of the first grade of the class, including Chinese, mathematics, English, physics, chemistry, biology, politics, history, geography, and English is regarded as the reference subject.

2.3 Research method

SPSS 26.0 is adopted to process data in this study. The procedures of data collection and analysis encompass four stages: selection, importation, operation and analysis.

Initially, considering the effectiveness and representativeness of the data, the scores of the students selected in this study are the test data of 2023, and the class comes from an ordinary high school in a relatively affluent area of Zhejiang province, which can roughly embody the learning status of students in a majority of areas.

Then, apart from English, this study divides the scores of all subjects into four levels, ranging from 1 to 4, the higher the score, the higher the level. The classification of diversified subjects are shown in table 1.

Table 1: Grade division table

	1	2	3	4
Total	≥ 650	600≤ s < 650	550≤ s < 600	< 550
Chinese	≥ 105	90≤ s < 105	75≤ s < 90	< 75
Math	≥ 100	80≤ s < 100	60≤ s < 80	< 60
Physics	≥ 65	55≤ s < 65	45≤ s < 55	< 45
Chemistry	≥ 70	55≤ s < 70	40≤ s < 55	< 40
Biology	≥ 70	55≤ s < 70	40≤ s < 55	< 40
Politics	≥ 70	55≤ s < 70	40≤ s < 55	< 40
History	≥ 80	70≤ s < 80	60≤ s < 70	< 60
Geography	≥ 80	65≤ s < 80	50≤ s < 65	< 50

Note: Scores are represented by the letter "s". To ensure that there are at least 2 cases per level, the grades are divided as above.

After that, test of homogeneity in SPSS is used for detailed data analysis.

Ultimately, the abundant data and charts procured are dissected meticulously, that is, the correlation between English scores and total scores as well as scores of other subjects, in order to expound on the current learning status and offer practical suggestions for instructors and students.

3. Results and discussion

This paper mainly probes into the correlation between English scores, total scores and scores of other subjects. In a bid to ensure the authenticity and accuracy of the study, the correlation coefficient charts of English scores, total scores and scores of other subjects are extracted from the SPSS data viewer for analysis and explanation.

3.1 Correlation analysis between English scores and total scores

Table 2 below unveils the correlation coefficients between the English score and the total score of the students in this class. As can be seen from the table, there are significant disparities in "English" scores between the high group (1) and the low group (4), the middle and upper group (2) and the low group (4), as well as the middle and lower group (3) and the low group (4). Therefore, it is evident that English score, which accounts for a relatively essential position in the total score, is significantly related to the total score. The higher the English score, the higher the total score. In addition, by observing students' English scores, we can discover that large gaps will emerge in English test scores, with a difference of 78 points between the highest score and the lowest score, which is even equivalent to the average score of one subject in seven-choice courses. Therefore, English as a compulsory course

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for every student, its status cannot be underestimated, since distinguished English performance stands as a momentous prerequisite for students to obtain outstanding results in the college entrance examination.

Table 2: Correlation coefficients between English scores and total scores

Group	Group	Sig.
1	2	0.300
	3	0.087
	4	0.003
2	3	0.378
	4	0.005
3	4	0.018

3.2 Correlation analysis between English scores and other subjects' scores

3.2.1 Correlation analysis between English scores and Chinese scores

The correlation coefficients between English and Chinese scores of students are demonstrated in table 3. As is illustrated, there are significant differences in "English" scores between group (1), group (3) and group (4), group (2) and group (3), as well as group (3) and group (4), which signifies that "English" literacy and "Chinese" literacy are similar, both belonging to the language subject and paying heed to memory as well as understanding. In addition, a mounting number of empirical studies on Chinese students have proved that Chinese learning exerts a sound impact on English learning, which involves ample respects such as language sub-system and language skills.[5] Thus, we can draw a conclusion that English scores and Chinese scores have a close correlation.

Table 3: Correlation coefficients between English scores and Chinese scores

Group	Group	Sig.
1	2	0.867
	3	0.040
	4	0.004
2	3	0.019
	4	0.003
3	4	0.016

3.2.2 Correlation analysis between English scores and math scores

Table 4 reveals the correlation coefficients between English scores and math scores of the students in senior one. Noticeably, a significant difference occurs between group (2) and group (3) in math, and no significant difference occurs in the scores of other groups, which means that the "English" competence of high school students is not closely tantamount to "math" competence. For students who are in the middle of their class in math, their English scores are directly proportional to their math scores, with higher English scores and higher math scores. However, for students who are strong or weak in math, their English scores are not directly linked to their math scores. For instance, some students may be particularly skilled at science, but they are not interested in some subjects that require memorization and recitation, thus the English score is not ideal. Others may lack the ability of careful calculation and logical reasoning, but adore some subjects like English. As a consequence, there is no intimate correlation between students' English scores and math scores, and the correlation between the two needs to be analyzed under specific conditions.

Table 4: Correlation coefficients between English scores and math scores

Group	Group	Sig.
1	2	0.537
	3	0.432
	4	1.000
2	3	0.035
	4	0.233
3	4	0.066

3.2.3 Correlation analysis between English scores and physics scores

The correlation coefficients between the English score and the physics score of the students are exhibited in table 5. Distinctly, there is no apparent correlation between the scores of "English" and

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"physics". During senior high school, the difficulty of all subjects has skyrocketed to an exorbitant level, the most conspicuous being "physics". This subject is a "nightmare" for an overwhelming number of students, as students start to be exposed to physics from the second year of junior high school. At that time, physics does not require students to do a lot of calculation, and plenty of knowledge points can be memorized. However, physics in senior high school needs students to have a strong logical thinking ability. Some students have a real knack for math, but not even physics. On the contrary, English course begins from primary school. By virtue of students' own efforts, like recitation and memory, their academic performance of English will advance more promptly. Therefore, the requirements of these two subjects are different, and there is no significant correlation between them.

Table 5: Correlation coefficients between English scores and physics scores

Group	Group	Sig.
1	2	0.999
	3	0.869
	4	0.914
2	3	0.808
	4	0.737
3	4	0.435

3.2.4 Correlation analysis between English scores and chemistry scores

Table 6 unfolds the correlation coefficients between English score and chemistry score of students. As is showcased in the table, marked disparities in "English" scores appear between group (1) and group (4), group (2) and group (4), as well as group (3) and group (4) in chemistry, thereby manifesting that the higher the score in chemistry, the higher the score in English. In a matter of fact, a sea of contents of chemistry also need to be accompanied by certain memorization, such as the nature of chemical elements and the name of experimental equipment, which is parallel with English acquisition, thus "English" score has an evident correlation with "chemistry" score.

Table 6: Correlation coefficients between English scores and chemistry scores

Group	Group	Sig.
1	2	0.989
	3	0.279
	4	0.026
2	3	0.191
	4	0.016
3	4	0.010

3.2.5 Correlation analysis between English scores and biology scores

The correlation coefficients between "English" scores and "biology" scores of students are expressly presented in table 7. It is not hard to find that "English" scores of group (2) are significantly distinguished from those of group (3) and group (4), and that of group (3) from group (4), which discloses that for a vast number of students, their biological achievement is directly proportional to their English achievement, and the higher the students' biological achievement, the English achievement will not be too low. As half of the knowledge points in biology require students to spend time memorizing and understanding, "English" scores in senior high are markedly connected with "biology" scores.

Table 7: Correlation coefficients between English scores and biology scores

Group	Group	Sig.
1	2	0.081
	3	0.931
	4	0.054
2	3	0.032
	4	0.007
3	4	0.025

3.2.6 Correlation analysis between English scores and politics scores

Table 8 displays the correlation coefficients between "English" scores and "politics" scores of students. In light of the data, arresting differences in "English" scores emerge between group (1) and group (3), as well as group (2) and group (3). This suggests that for numerous students, the better the politics score, the higher the English score. Nonetheless, for a small number of students, as the chapter

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of economics in politics discipline involves currency exchange rate and other indigestible contents, students also ought to have certain calculation and reasoning skills. If students are scarce of these skills, even if their English scores are excellent, their politics scores may not be satisfactory, which acts as one of the underlying reasons why there is no significant difference in English scores between the high and low groups.

Table 8: Correlation coefficients between English scores and politics scores

Group	Group	Sig.
1	2	0.999
	3	0.029
	4	0.109
2	3	0.007
	4	0.061
3	4	0.962

3.2.7 Correlation analysis between English scores and history scores

The correlation coefficients between English scores and historical scores of students in this class are unearthed in table 9. Apparently, there are substantial differences in "English" scores between group (1) and group (4), group (2) and group (4), as well as group (3) and group (4). In that history requires students to recite and memorize a large number of text contents and illustrations, students need to be patient and careful, which resembles English learning. Hence, there is a striking correlation between the scores of the two disciplines, that is, the better the score of history, the better the score of English.

Table 9: Correlation coefficients between English scores and history scores

Group	Group	Sig.
1	2	0.915
	3	0.979
	4	0.026
2	3	0.385
	4	0.004
3	4	0.010

3.2.8 Correlation analysis between English scores and geography scores

Table 10 unmasks the correlation coefficients between the English achievement and the geography achievement of the students in senior high school. It is obvious that there are prominent differences in "English" scores between group (1) and group (4), group (2) and group (4), as well as group (3) and group (4). It's widely acknowledged that geography is in part tantamount to history, and most of the contents need to be memorized and understood by students. The division of climate and the structure of the earth requiring long-term memorization are vivid illustrations. Therefore, an overt correlation falls on students' geography achievement and English achievement.

Table 10: Correlation coefficients between English scores and geography scores

Group	Group	Sig.
1	2	1.000
	3	0.310
	4	0.007
2	3	0.061
	4	0.003
3	4	0.007

Based on above vivid data and plain charts, this paper cautiously draws the following conclusions:

To begin with, the subject of English is highly correlated with students' total scores. The higher the English score, student's total score will be relatively higher.

Additionally, the learning methods of English are similar to those of Chinese, politics, history and geography. These subjects are tightly related to each other, and acquisition of them is inseparable from students' memory and understanding ability. Students with good English scores are relatively adept at reciting knowledge points.

Moreover, learning chemistry and biology not only requires logical reasoning and calculation ability, but also needs students to invest sufficient time and efforts in reciting and memorizing a certain portion of contents, thus these two subjects are also relevant to English.

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Last but not least, math and physics have the least association with English in terms of learning contents, methods and students' academic accomplishments.

4. Conclusion and implications

Grounded on the correlation analysis of students' English scores with total scores and scores of other subjects by means of SPSS, it is not hard to find that a high correlation exists between English scores and total scores, thus we ought to attach great significance to the status of English. Meanwhile, the degree of correlation between multifarious subjects and English is disparate. Among them, five subjects containing Chinese, chemistry, biology, history and geography are more associated with English, while two subjects involving math and physics are relatively less connected with English. Therefore, some enlightening implications from the above conclusions to the teaching and learning of ordinary classes in senior high school are demonstrated as follows:

First and foremost, pay attention to the subject of English and allocate time reasonably. It's relatively easy for students to expand the gap in English examination according to the results of investigation. Hence, students should lay an emphasis on the study of English and devote necessary efforts to it, but this does not mean to neglect the study of other subjects. At the same time, taking their own situation into account is also a useful strategy. If students' English level is superior, then they continue to maintain such a learning state, whereas if their English score is not ideal, they'd better reassign the study time and free up some time for English.

In addition, seek for interdisciplinary knowledge points and design the teaching content meticulously. In the course of teaching, if instructors discover that a certain part of knowledge points overlaps with other subjects, they should first figure it out thoroughly, and then employ the knowledge points to connect the contents of two or more subjects together in an effect to assist students in better enriching their horizons, learning and understanding. When students are learning or doing exercises, if they encounter similar situations, they should also assess their own grasp of the knowledge point. If they are not informed clearly, they should consult the teacher appropriately and consolidate it in time.

Furthermore, place a high value on drawing inferences from one another and imparting ideological methods. The correlation between diverse disciplines is not only embodied in knowledge points, but also contained in thinking methods. Ideas such as categorical discussion and deductive reasoning can be applied to various subjects. Therefore, while expounding on knowledge, teachers should also cultivate students how to think and learn to think, and students are capable of learning and using the methods they have acquired in miscellaneous situations, which is the real essence of teaching and learning.

A profound analysis of students' academic achievement proves to be a boon for optimizing course arrangement and improving teaching quality.[6] As an in-depth analysis of the scores of students in senior high school, this study attempts to propose some constructive advice on updating English instructors' teaching value and students' learning concepts to a certain extent. It is fervently expected that more scholars who harbor passion for education will delve into students' academic achievements, pinpoint existing problems and offer corresponding suggestions from a professional perspective, thereby providing references for more teachers and students, so as to incessantly promote the quality of teaching and learning.

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