

Research Article

Data Analytics and Research on Quantitative Analysis in College English Teaching

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Abstract

College English is a compulsory course of Non-English majors. It is not only a basic course to learn language, but also to expand knowledge and know global cultures. College English, guided by foreign language teaching theory, mainly involves English knowledge and practical skills, cross-cultural communication and learning strategy. Its instructional goal is to train students' comprehensive and practical ability, especially their listening and speaking skills. Thus, they can communicate with others in English in their study, work and social intercourse, increase their capacity of independent study and overall cultural awareness, so as to fit well with the demands of national development and international exchange. It is a tool with cultural connotation. Thus, we must take full consideration of training students' cultural awareness and teaching worldwide cultural knowledge while designing the college English courses. That means College English Curriculum Requirements attach importance to culture. It is an irresistible trend that language and culture is of equal significance. Therefore, Teachers must enhance their cultural cultivation, store cross-culture knowledge and draw lessons from advanced teaching theory. Through various teaching and extracurricular activities, they should enhance students' awareness of cross-culture and communication competence, as well as the cognition and understanding of different countries and cultures. In this way, we can cultivate graduates with both solid professional foundation and ability of international exchange. At the same time, College English teachers must have digital awareness and collect true data in teaching, using effective data to do quantitative research and analysis, such as One-Sample T Test, Independent - Samples T Test, Paired - Samples T Test, One - Way ANOVA, Correlation Analysis, Factor Analysis and so on. So that College English teachers can solve the problems effectively in teaching by data analysis.

Keywords

Data Analytics, Quantitative Research, College English Teaching, Digital Awareness

1. Introduction

The Outline of the 14th Five-Year Plan and the Vision 2035 (draft) proposes to embrace the digital age, activate the potential of data elements, accelerate the construction of digital economy, digital society and digital government, and drive the transformation of mode of production, mode of life

and mode of governance with digital transformation as a whole. In the future, intelligent data will continue to penetrate into various key fields and links of people's production and life, and comprehensively help the construction of digital China [1]. With the development of the society, Higher edu-

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cation is also making progress rapidly, moving towards high quality gradually with the rapid progress of domestic college reforms. The construction of an efficient information management method is an important part of colleges and universities during the reform. Informatization construction can help colleges and universities to collect, organize and analyze the massive amounts of data generated in teaching at school quickly and efficiently [2].

In the era of big data, empirical research and quantitative research have become important aspects of talent cultivation. Learn the characteristics of the big data era and understand the significance of data analysis skills in talent cultivation. The popularization of informatization has generated a large amount of data in various industries, such as daily sales data and commodity flow data generated in the commercial field, daily production process control and raw materials generated in the production field Status data, daily student learning behaviors and status data generated in the field of education. Should we put these data there, or use them to identify patterns in commercial sales, product production, learning, and teaching? The answer is self-evident: speak with data. Quantitative research has become a consensus in today's society to analyze and handle problems, and data analysis and processing abilities have also become the core competitiveness of contemporary talents [3]. With the expansion of data scale and the acceleration of data creation frequency, data analysis and data processing are no longer simple technologies, but have become a profession and an industry. So, the concept of "big data" emerged. "Information explosion" and "big data" are important features of today's era. What exactly is "big data"? Big data refers to the massive amount of data generated by the daily operations of internet companies and accumulated through user network behavior. The emergence of "big data" is not accidental, it is a process that must be experienced in today's highly developed information and networking era, where data is everywhere. "Big data" is a term that carries cultural genes and marketing concepts, while also reflecting the trends in the development of the technology field. This trend opens a new door to understanding the world and making decisions. Today's society is known as the era of big data, which includes three levels of meaning. Firstly, data has penetrated into various industries, and humans are constantly dealing with it. Secondly, the volume of data is enormous. Through the teaching practice of the course "Selection of Statistical Methods and Implementation of SPSS", this study explored the establishment of biostatistics education model suitable for postgraduates majoring in biology, and further explored the connotation of ideological and political education in the course [4].

Informatization construction and data analysis can help College English teachers analyze current situation of teaching and find the problems of teaching, evaluating future development effectively, solving the problems in College English teaching. With the results of the informatization construction of a domestic university, this paper will analyze

various methodology of dealing with teaching data, such as One-Sample T Test, Independent - Samples T Test, Paired - Samples T Test, One - Way ANOVA, Correlation Analysis, Factor Analysis and so forth, drawing corresponding conclusions based on some actual data in teaching. These data analysis method will provide colleges and universities with more data support, making teachers and students realize the importance of data analysis culture, increasing college students' degree of recognition on data analysis awareness, and improving non- English majors' data analysis sensitivity [5]. This kind of sensitivity and method can make teachers adjust corresponding teaching strategies better, and improve the construction level of all aspects in teaching, improving the teaching efficiency of College English and serving the young people better.

2. T Test

The basic idea of hypothesis testing is to first propose hypotheses about the population parameter values, and then use the information provided by the sample to verify whether the previously proposed hypotheses are valid. If the sample data cannot fully prove and support the hypothesis, then under certain probability conditions, the hypothesis should be rejected; On the contrary, if the sample data cannot fully prove and support the hypothesis, the rationality and authenticity of the hypothesis cannot be overturned. The above hypothesis testing and inference process is based on the principle of small probability, which means that a random event with a very small probability of occurrence is almost impossible to occur in a specific experiment [6]. More and more liberal arts majors are offering SPSS statistical courses, teaching the use of SPSS as a statistical analysis tool. Its teaching content integrates research methods, statistical methods, research case scenarios, and data, making it an important course for humanities students to integrate humanities and science [7].

The SPSS software is easy to operate, and for beginners or related practitioners, commonly used tools and methods can be basically completed through menu operations and dialog boxes. There is no need for programming or memorizing complex calculation formulas. Simply input data and understand the terminology of relevant methods to obtain the desired results, which can be applied to students from different majors SPSS software is compatible with multiple data file formats, including DAT, SLK, DBF, and other file formats that can be opened in SPSS software SPSS software has powerful chart functions, and the generated graphics for analysis can be saved in various graphic formats [8].

2.1. Definition of T Test

T Test, That is, the significance of the difference between the two groups of data, it can be classified Paired-Samples T Test and Independent Sample T-test.

2.2. The Usage of T Test

1. Compare whether there is a significant difference between two small sample groups

For example:

Are the pre-test data of the two classes the same?

Is there a significant difference before and after the implementation of a certain teaching strategy in a teaching class?

Method:

Two-sided test of mean value

2. After some intervention, has the sample improved? For example:

Whether the two groups of patients with the same pre-test are effective after one group tries the new drug.

Method:

One-sided test of mean value

2.3. Paired-Samples T Test

T Test Review and Basic conditions for performing T Test on data:

Data type:

1) Range data or sequencing data with a high degree of differentiation

2) Distribution pattern:

3) Meet the normal distribution, or close to it

Example of Paired Samples T Test:

For example:

It is known that the first, second and third time College English Test scores of Class One, Freshman of Marxism majors are shown in the list. Please check whether there is a significant difference between the first and second time College English Test scores? Whether there is a significant difference between the first and third time College English Test scores? The College English Test scores and data is in the following Picture One.

配对样本数据1.sav [DataSet1] - IBM SPSS Statistics Data Editor

	Number	Name	Gender	English1	English2	English3	History	Chinese
1	20231231	杨佳慧	女	80	87	97	81	78
2	20231232	汪祎嫫	男	94	75	85	82	91
3	20231233	徐玲露	女	72	74	84	73	85
4	20231234	马玉碧	女	68	83	93	83	82
5	20231235	伍新燕	男	80	80	90	80	80
6	20231236	曾昭容	男	85	87	97	88	13
7	20231237	胡鑫源	女	89	69	79	67	13
8	20231238	唐钰茜	女	84	72	82	61	13
9	20231239	唐淑银	男	84	87	97	87	13
10	20231240	祝颜	女	68	81	91	81	13
11	20231241	王淑	女	95	82	82	82	87
12	20231242	任楠	女	87	92	102	90	87
13	20231243	刘瑀琰	男	98	86	96	88	95
14	20231244	潘琪	女	75	90	100	90	75
15	20231245	税思惠	女	77	85	95	85	77
16	20231246	阳志广	男	81	91	101	91	81
17	20231247	周金锐	男	85	83	93	83	85
18	20231248	万俊良	女	89	77	87	65	89
19	20231249	张晓含	女	80	83	93	83	80
20	20231250	彭雨露	男	69	95	105	95	69
21	20231251	李嘟嘟	男	78	99	109	99	78

Figure 1. Paired Samples Data.

Analysis:

Conduct a difference test on two English scores to check for any significant differences.

If Paired-Samples T Test is used, the following questions should be clarified:

1) The English score follows a normal distribution

2) It is two exams targeting the same group of samples, and there is a one-to-one correspondence between the scores

3) Perform Paired-Samples T Test on English scores Normal Distribution data

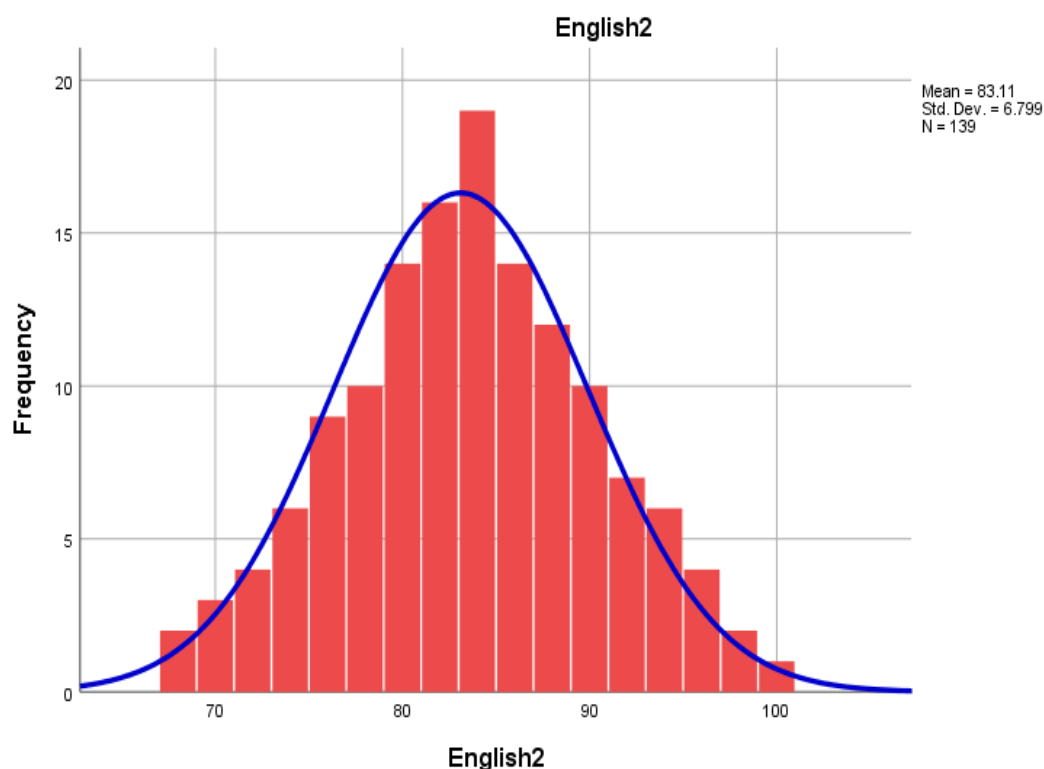


Figure 2. Normal Distribution data.

Application of Paired Sample T Test

Implementation process - based on SPSS (Statistical Package for the Social Sciences) functionality

1) Determine whether the two English scores meet the requirements Normal Distribution (K-S test or S-W test)

2) Perform Paired Sample T Test

Analysis \Rightarrow Comparison of mean \Rightarrow T Test for Paired Samples

a. Select variable 1: English 1

b. Select variable 2: English 2

Set the confidence interval to 95%

Finally "confirm"

3) Read Output Results

Observing the sig value (i.e. testing probability P-value)

$P > 0.05$ not significant

$P < 0.05$ significant

Table 1. (NPar Tests).

One-Sample Kolmogorov-Smirnov Test				
		English1	English2	English3
N		143	143	143
Normal Parameters ^{a,b}	Mean	83.71	83.53	93.39
	Std. Deviation	7.013	6.906	7.126
Most Extreme Differences	Absolute	0.079	0.084	0.086
	Positive	0.061	0.084	0.083
	Negative	-0.079	-0.079	-0.086
Test Statistic		0.079	0.084	0.086
Asymp. Sig. (2-tailed)		.028 ^c	.015 ^c	.011 ^c
Exact Sig. (2-tailed)		0.313	0.251	0.222

One-Sample Kolmogorov-Smirnov Test			
	English1	English2	English3
N	143	143	143
Point Probability	0.000	0.000	0.000
a. Test distribution is Normal.			
b. Calculated from data.			
c. Lilliefors Significance Correction.			

Using SPSS to deal with the test data, making full use of its functionality and implementation process we can get the result from [Table 1](#) (NPar Tests), that is to say the Nonparametric Statistical Test, the first, second and third English Test we get Exact Sig. The Exact Sig of the first English Test is 0.313, The Exact Sig of the second English Test is 0.251, The Exact Sig of the third English Test is 0.222, all of them are big than 0.05, so the English score follows a normal dis-

tribution, we can deal with the data by SPSS to get the research result. Clustering is an important algorithm in data mining, which analyzes data objects in daily life by grouping objects with similar or similar properties into one class, and grouping objects with different properties into different classes. By studying clustering analysis, we can extract useful information from complex real-life situations, better analyze data, and reflect social information in daily life [\[9\]](#).

Table 2. Paired Samples Statistics.

Paired Samples Statistics					
		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	English1	83.71	143	7.013	0.586
	English2	83.53	143	6.906	0.577

We can get the Mean from [Table 2](#). The first English Test, that is to say the Mean of English1 is 83.71. The second English Test, that is to say Mean of English1 is 83.53.

Table 3. Paired Samples Correlations.

Paired Samples Correlations				
		N	Correlation	Sig.
Pair 1	English1 & English2	143	-0.131	0.118

From [Table 3](#) We know that there are 143 samples. The Correlation is -0.13 between the first and second English Test. We can get relevant data From the following [Table 4](#). The Mean is 0.175. Sig. (2-tailed) is 0.842, that is to say, $P > 0.05$, so the difference between the first and second College English Test not significant.

Table 4. Paired Samples Test.

Paired Samples Test		Paired Differences			95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	Lower				
					Upper				
Pair1	English1- English2	0.175	10.469	0.875	-1.556	1.905	0.200	142	0.842

Table 5. Paired Samples Statistics.

Paired Samples Statistics		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	English1	83.71	143	7.013	0.586
	English3	93.39	143	7.126	0.596

We can get the Mean from Table 5. The first English Test, that is to say the Mean of English 1 is 83.71. The third English Test, that is to say the Mean of English 3 is 93.39. There are 143 samples totally.

Table 6. Paired Samples Correlations.

Paired Samples Correlations		N	Correlation	Sig.
Pair 1	English1 & English3	143	-0.152	0.070

From Table 6 We know that there are 143 samples. The Correlation is -0.152 between the first and third English Test. We can get relevant data From the following Table 7. The Mean is -9.685. Standard Deviation is 10.731. Standard Error Mean is 0.897. Sig. (2-tailed) is 0.000, that is to say, $P < 0.05$, so the difference between the first and third College English Test is very significant.

Table 7. Paired Samples Test.

Paired Samples Test		Paired Differences						Sig. (2-tailed)	
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t		df
					Lower	Upper			
Pair 1	English1- English3	-9.685	10.731	0.897	-11.459	-7.911	-10.793	142	0.000

2.4. Independent-Samples T Test

Frequently-used statistical analysis methods based on disordered multi-classification data included correspondence analysis, chi-square test, multinomial logistic regression. Number of variables, analysis aim, precondition of data analysis method would be sup-posed to be considered before selecting statistical analysis methods [10].

T Test Review and Basic conditions for performing Independent-Samples T Test on data:

Data type:

1) Range data or sequencing data with a high degree of

differentiation

2) Distribution pattern:

3) Meet the normal distribution, or close to it

Example of Independent-Samples T Test:

For example:

It is known that the College English Test scores of Class One, Freshman of Marxism majors are shown in the list. Please check whether there is a significant difference of College English Test scores between the boys and girls? The College English Test scores and data is in the following Picture Two.



	学号	姓名	性别	Chinese	English	gender	变量
1	20231231	杨佳慧	女生	80	92	girl	
2	20231232	汪祎麟	男生	84	65	boy	
3	20231233	徐玲露	女生	72	79	girl	
4	20231234	马玉碧	女生	68	88	girl	
5	20231235	伍新燕	男生	70	70	boy	
6	20231236	曾昭容	男生	75	77	boy	
7	20231237	胡鑫源	女生	89	74	girl	
8	20231238	唐钰茜	女生	84	77	girl	
9	20231239	唐淑银	男生	74	77	boy	
10	20231240	祝颜	男生	68	81	boy	
11	20231241	王淑	女生	95	87	girl	
12	20231242	任楠	女生	87	97	girl	
13	20231243	刘璐琰	男生	88	76	boy	
14	20231244	潘琪	女生	75	95	girl	
15	20231245	祝思燕	女生	77	91	girl	
16	20231246	阳志广	男生	71	81	boy	

Figure 3. Independent Samples Data.

Analysis:

Conduct a difference test on College English scores between the boys and girls to check for any significant difference.

If Independent-Samples T-Test is used to solve the problem. We must pay attention to the following conditions and the following questions should be clarified:

- The College English score follows a normal distribution
- There is no one-to-one correspondence between male and female students' grades, and even the numbers are different. That is to say, the number of male and female students is different.

We must pay attention to the variance is homogeneous for it has a significant impact on the data's analysis results.

Application of Independent-Samples T-Test

Implementation process - based on SPSS (Statistical Package for the Social Sciences) functionality

- Determine whether the College English scores meet the

requirements Normal Distribution (K-S test or S-W test)

b. Perform Independent-Samples T-Test

c. Interpretation of data results.

We must pay attention to Levin's Test for homogeneity of variance.

Let's first look at the sig value of F, If it is greater than 0.05, then look at the sig value in the first row, If it is less than 0.05, then look at the sig value in the second row

Analysis \Rightarrow Comparison of mean \Rightarrow T Test for Independent Samples

a. Select variable 1: English 1

b. Select grouping variable: gender

Set the confidence interval to 95%

Finally "confirm"

4) Interpretation of Data Output Results

Observing the sig value (i.e. testing probability P-value)

If $P > 0.05$ not significant

If $P < 0.05$ significant

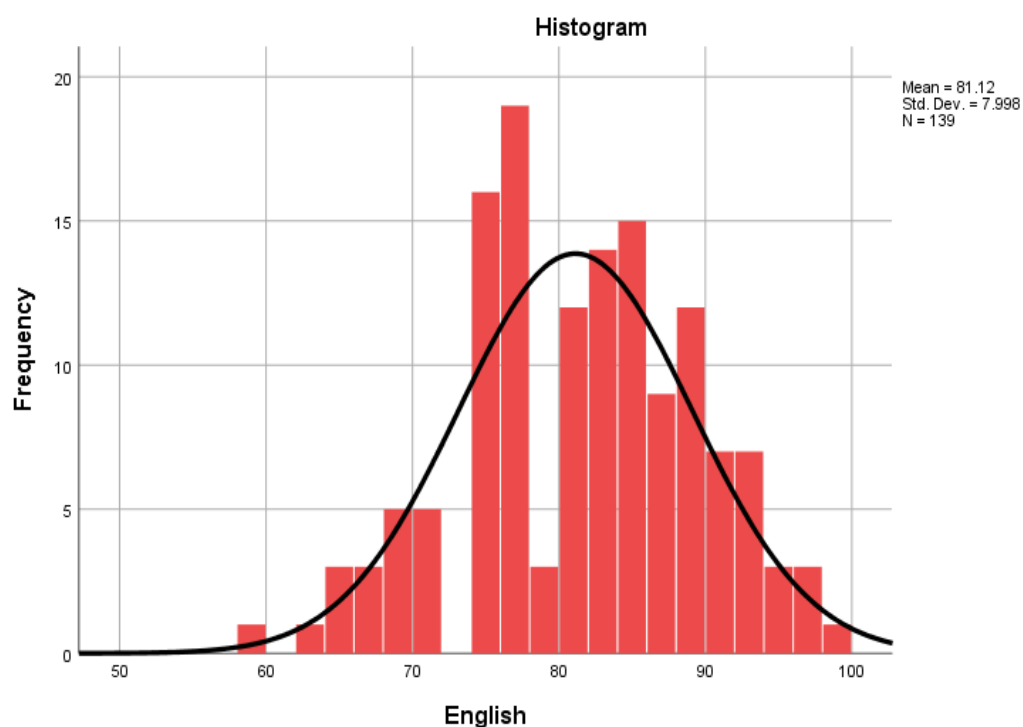


Figure 4. Normal Distribution data.

Table 8. (NPar Tests).

One-Sample Kolmogorov-Smirnov Test		
		English
N		144
Normal Parameters ^{a,b}	Mean	81.10
	Std. Deviation	7.914
	Absolute	0.087
Most Extreme Differences	Positive	0.087
	Negative	-0.061
Test Statistic		0.087
Asymp. Sig. (2-tailed)		.010 ^c
Exact Sig. (2-tailed)		0.218
Point Probability		0.000
a. Test distribution is Normal.		
b. Calculated from data.		
c. Lilliefors Significance Correction.		

Using SPSS to deal with the test data, making full use of its functionality and implementation process we can get the result from Picture 4. The data is high in the middle and low

on both sides, so the English score follows a normal distribution. By using NPar Tests, that is to say the Nonparametric Statistical Test, We can get the data in Table 8. The Exact

Sig of the College English Test is 0.218, it is greater than 0.05, so the College English score follows a normal distribu-

tion, we can deal with the data by SPSS to get the research result.

Table 9. Group Statistics.

Group Statistics					
Gender		N	Mean	Std. Deviation	Std. Error Mean
English	boy	59	75.46	6.618	0.862
	girl	85	85.01	6.208	0.673

We can get the Mean from Table 9. The boys' English Test, that is to say the Mean of The boys' College English is 75.46. The girls' English Test, that is to say the Mean of The girls' English is 85.01. There are 144 samples totally.

Table 10. Independent Samples Test.

Independent Samples Test										
		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
English	Equal variances assumed	0.000	0.988	-8.839	142	0.000	-9.554	1.081	-11.691	-7.417
	Equal variances not assumed			-8.737	119.654	0.000	-9.554	1.094	-11.719	-7.389

From Table 9 We know that there are 144 samples totally. We know that we will look at the sig value of F firstly. If it is greater than 0.05, then look at the sig value in the first row, If it is less than 0.05, then look at the sig value in the second row. From Table 10 We know that sig value of F is 0.988, it is greater than 0.05. So we should look at the sig value in the first row, it is 0.000, that is to say Sig (2-tailed) is 0.000. $P < 0.05$, so the difference between the boys and girls' College English Test is very significant.

3. Analysis of Variance

3.1. Definition of Analysis of Variance

Analysis of variance is also a Test of Mean Difference, which studies whether different levels of a factor will have a significant difference in the mean of the results. Analysis of

variance (ANOVA) studies the significant differences in mean values between multiple sample groups, which are composed of different levels of a certain factor.

What problems does Analysis of Variance mainly solve? It studies whether there will be significant differences in the result values of samples at different levels of a certain factor. Such as study whether there are significant differences in English scores among students with different hobbies (literature, art, science). Its essence is the mean difference Test, which analyses whether there is a significant difference in English scores among groups based on hobby grouping.

3.2. Prerequisite Conditions in Analysis of Variance

Result variable (dependent variable)

Basically satisfying a normal distribution, it should be a

fixed distance variable, at least a higher measured ordered variable.

Factor variable (grouping variable)

It can be ordered variable or a numerical categorical variable, and continuous fixed distance variable are rarely used.

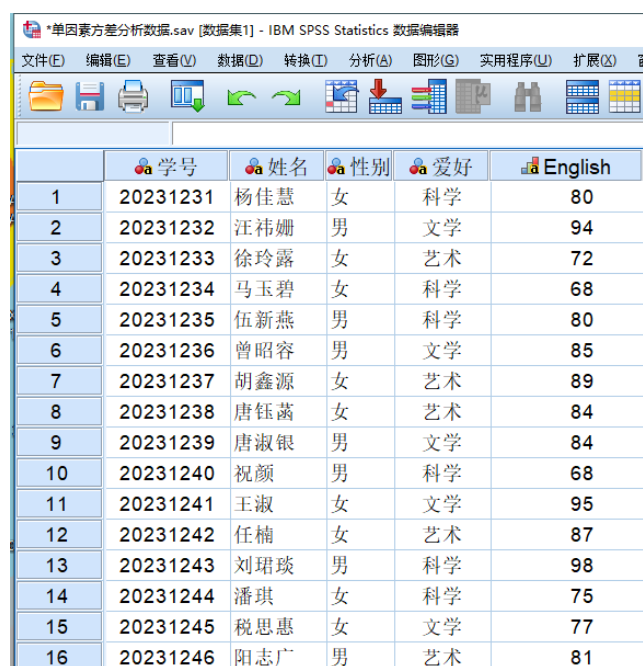
Discrepancy requirements for data

In the aspect of discrepancy requirements for data is that homogeneity of variances among different groups.

3.3. Case of Analysis of Variance: One-Way Analysis of Variance

For example:

It is known that the College English Test scores of Class One, Freshman of Marxism majors are shown in the list. Please check whether there is a significant difference of College English Test scores among the students with different hobbies? The College English Test scores and data is in the following Picture Five.



	学号	姓名	性别	爱好	English
1	20231231	杨佳慧	女	科学	80
2	20231232	汪祎娜	男	文学	94
3	20231233	徐玲露	女	艺术	72
4	20231234	马玉碧	女	科学	68
5	20231235	伍新燕	男	科学	80
6	20231236	曾昭容	男	文学	85
7	20231237	胡鑫源	女	艺术	89
8	20231238	唐钰菡	女	艺术	84
9	20231239	唐淑银	男	文学	84
10	20231240	祝颜	男	科学	68
11	20231241	王淑	女	文学	95
12	20231242	任楠	女	艺术	87
13	20231243	刘琚琰	男	科学	98
14	20231244	潘琪	女	科学	75
15	20231245	税思惠	女	文学	77
16	20231246	阳志广	男	艺术	81

Figure 5. One-Way ANOVA Data.

Analysis:

Conduct a Difference Test on College English scores

among the students with different hobbies to check for any significant difference.

If One-Way Analysis of Variance is used to solve the problem. We must pay attention to the following conditions and the following questions should be clarified:

- 1) The College English score follows a normal distribution.
- 2) The grouping variable (hobby) in this example is a low-measure grouping variable.
- 3) We must pay attention to the variance is homogeneous for it has a significant impact on the data's analysis results.
- 4) This example is a typical One-Way ANOVA (One-Way Analysis of Variance). "English" is dependent variable (result variable), "Hobby" is independent variable (factor variable), and its different values are the level of factor.

Application of One-Way Analysis of Variance

Implementation process - based on SPSS (Statistical Package for the Social Sciences) functionality.

- 1) Determine whether the College English scores meet the requirements Normal Distribution (K-S test or S-W test).
- 2) Perform One-Way Analysis of Variance.
- 3) Interpretation of data results.

We must pay attention to Levin's Test for homogeneity of variance.

Let's first look at the sig value of F, If it is greater than 0.05, We consider that the variance between different groups is homogeneous. The Analysis of Variance is of homogeneity, The data is suitable for analysis of variance. If it is less than 0.05, the variance between different groups is homogeneous, The Analysis of Variance is not of homogeneity, The data isn't suitable for analysis of variance.

Analysis \Rightarrow Comparison of mean \Rightarrow One-Way Analysis of Variance

- a. Select variable: English
- b. Select the factor: hobby

Click options \Rightarrow homogeneity of variance \Rightarrow Click continue

Finally "confirm"

- 4) Interpretation of data output results

Observing the sig value (i.e. testing probability P-value)

If $P > 0.05$ not significant

If $P < 0.05$ significant

Table 11. Test of Homogeneity of Variances.

Test of Homogeneity of Variances		Levene Statistic	df1	df2	Sig.
College English	Based on Mean	0.467	2	139	0.628

Test of Homogeneity of Variances				
	Levene Statistic	df1	df2	Sig.
Based on Median	0.447	2	139	0.641
Based on Median and with adjusted df	0.447	2	138.752	0.641
Based on trimmed mean	0.467	2	139	0.628

Using SPSS to deal with the test data, making full use of its functionality and implementation process we can get the result of Homogeneity of Variances from Table 11. Based on Mean the Sig of the Test of Homogeneity of Variances of

College English is 0.628, it is greater than 0.05, so we can deal with the data by SPSS to conduct the Analysis of Variance to get the research result.

Table 12. ANOVA.

ANOVA					
College English	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	42.501	2	21.251	0.430	0.651
Within Groups	6862.090	139	49.368		
Total	6904.592	141			

From Table 12 We know that there are 141 samples totally. Sum of Squares is 42.501 between groups. Sum of Squares is 6862.090 within groups. The sig value is 0.651, it is greater than 0.05, that is to say Sig is 0.651. $P > 0.05$. So there is not significant difference of College English Test scores among the students with different hobbies. Hobbies are not the reason for significant differences in college English test.

4. Conclusions

In the era of information technology in education, we have to face massive data every day. To tap valuable educational information from the data, we need to acquire powerful data analysis capabilities, and therefore it is more and more important for us to develop data analysis capabilities. Scientific data analysis require an efficient statistical analysis software. SPSS is recognized as an outstanding statistical analysis software, which is widely applied [11]. The digital era is accelerating the breaking of traditional teaching structures and rules. College English teaching is facing new challenges in the digital era and new opportunities for innovative development. A new round of technological revolution and industrial transformation is flourishing, and the new generation of information technology represented by digital technology is accelerating the reshaping of the economic and social devel-

opment mode, bringing new opportunities and challenges to the innovative development of English teaching in China [12]. The reform of college English teaching is facing new situations and conditions such as interdisciplinary integration and cross development, accelerated application of digital technology in research and teaching, and changes in talent demand in the digital age. To better adapt college English to the new requirements of the digital era, we should jointly promote the reform of college English teaching from the dimensions of conceptual innovation, professional settings, course content, teacher training, evaluation system, etc, and explore a feasible reform path. Therefore, teachers' teaching methods, classroom teaching models, and student learning methods should keep pace with the times, and deepening the reform of college English teaching is very urgent. At the same time, Colleges English teachers should learn to deal with teaching data, such as One-Sample T Test, Independent - Samples T Test, Paired - Samples T Test, One - Way ANOVA, Correlation Analysis, Factor Analysis and so forth. These data analysis method will provide colleges English teachers more data support, adapting to corresponding teaching strategies better [13]. Therefore, teachers' teaching methods, classroom teaching models, and student learning methods should keep pace with the times, and deepening the reform of college English teaching is very urgent. Cultivating learners' critical thinking skills in English teaching has been

widely recognized. There exist a variety of factors affecting the generation of critical thinking skills in English classroom teaching and the influence of these factors on classroom teaching varies in degree [14].

Author Contributions

Ronglin Shan is the sole author. The author read and approved the final manuscript.

Conflicts of Interest

The author declares no conflicts of interest.

References

- [1] Ma Xiulin, Professional Development of Teachers in the Information Age [M]. Beijing Normal University Press, 2017.
- [2] Zeyi Yang. Models and application on university subjects and students data analysis using multiple data mining strategies method [D]. Lanzhou: Lanzhou university, 2018. P III.
- [3] Ma Xiulin, Quantitative Research & SPSS Data Analysis [M]. Beijing Normal University Press, 2020. P3.
- [4] FU Yuan-hui, HE Jin-sheng, Exploring the Connotation of Ideological and Political Education for Selection of Statistical Methods and Implementation of SPSS [J]. Education And Teaching Forum, Issue 5, 2024, P165.
- [5] Li Wei, Zhan Kaimin, Research on the Mechanism and Implementation Path of Digital Development in Higher Education [J]. Journal of Heilongjiang Institute of Teacher Development, Volume 43, Issue 5, 2024, P68.
- [6] Xue wei, Statistical Analysis and SPSS Application [M]. Renmin University of China Press, 2017. P108.
- [7] Li Changjun, Jia Jucai, Exploration of the "343" Teaching Model on The Development of SPSS Statistics Course in the Context of New Liberal Arts [J]. Hei Longjiang Education (Theory & Practice), Issue 3, 2024, P42.
- [8] Zhang Yimin, Application of SPSS in Teaching Probability Theory and Mathematical Statistics [J]. Studies in College Mathematics, Issue 5, 2023, P57.
- [9] Yan Hao, The Application Clustering Analysis Based on SPSS in Industry Statistical Data [D]. Jilin University, 2013, P37.
- [10] Zhang Liaohong, Selection of Statistical Analysis Methods Based on Disordered Multi-classification Data and Complication by SPSS Software [J]. Journal of Changchun Normal University, Issue 12, 2023, P113.
- [11] Wang Panhua, The Development of Textbook Based on Case-Based Teaching [D]. Central China Normal University, 2014, P2.
- [12] LU Jing, The Opportunities, Challenges and Paths of College English Teaching Reform in the Digital Era [J]. Journal of Shandong Agricultural Engineering College, Volume 40, Issue 8, 2023, P125.
- [13] SUN Lin, SONG Xin, Research on Quantitative Analysis of SWOT Based on M-learning in College English Teaching [J]. Journal of Dalian Minzu University, Volume 19, Issue 6, 2017, P42.
- [14] Feng Xin, Analysis of Factors Influencing the Generation of English Classroom Teaching with a Focus on Critical Thinking Ability [J]. Journal of Xi'an International Studies University, Issue 6, 2015, P83.

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