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Mathematical statistical model based on the effect of SPSS physical education

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ABSTRACT

Physical education teaching achievement is a direct reflection of the sporting quality of teaching is good or bad, and the statistical analysis of the results of the Physical Education is an important part of the process of physical education, teachers can draw through statistical analysis of the results, the effect of their teaching and student learning, exam real quality education services. How can you better, faster analysis of sports achievements in teaching is a very important issue. In this paper, we study on the methods and procedures of PE teaching statistic analysis based on SPSS software, and provide an approach for the analysis of the scores in PE teaching.

KEYWORDS

SPSS;
Teaching;
Statistical analysis;
Normal distribution.

INTRODUCTION

The statistic analysis of the PE teaching score is an important part of the teaching process, and also is a necessary way to reflect teaching results. Therefore, it is necessary for us to do a more in-depth and detailed statistic analysis in order to know the PE teaching effectiveness, students' mastery of the knowledge and skills, and at the same time to regulate and guide the teachers' behaviour, which help make exams truly serving quality education. The exam is one of the important methods to evaluate the quality of teaching, measure the effectiveness, and identify the quality of talents. Since all the teaching of PE courses are detected and monitored by means of exams, so how to accurate positioning the exam and how to properly treat the exam results have become an extremely important issue in modern education. Currently, the vast majority of the examination results are given in the form of marks, so the assessment and use of the marks become particularly important. Accurate analysis and assessment of the students' scores will provide an important basis to guide teaching and improve students' grade.

In face of a pile of sports test data, checking the points and doing statistics are very complicated. It is not only error-prone, but also difficult to be collected, standardized and organized with a scientific and rational method. As a result of this, a large number of first-hand data resources cannot be provided as accurate scientific data for future teaching, which is an enormous waste and pity for each PE teacher. Formerly people do data statistic analysis mostly by hand and EXCEL. Excel is the most basic tool in data analysis for its easy to grasp, but it is not suitable for large-scale statistic

analysis. SPSS has been widely accepted for its easy to learn and use, as well as with a large number of sophisticated statistic analysis methods, impeccable operation management of the data definition, open data interface, and flexible statistic tables and statistic graphics. This paper studies how to do statistic analysis of PE teaching scores using SPSS software. The data in this article come from the PE final exam scores of freshmen in a college.

ANALYSIS OF THE SYNTHETICALLY EVALUATION SCORE

Synthetically evaluation score indicates the total score of PE final exam, usual test and PE attendance.

(1) Quartile of the synthetically evaluation score

TABLE 1 indicates that the minimum value of synthetically evaluation score is 68.6, and the maximum value is 89.1 marks. Among them, 25% of the students' synthetically evaluation score is 74.41, 50% of the students' synthetically evaluation score is 80.37, and 75% of the students' synthetically evaluation score is 85.22. Quartile difference confirmed that the students' synthetically evaluation score shows regular left-skewed distribution.

TABLE 1 : Synthetically evaluation score Statistics

N	Valid	31
	Missing	0
Minimum		68.6
Maximum		89.1
Percentiles	25	74.41
	50	80.37
	75	85.22

(2) Histogram of the synthetically evaluation score

Figure 1 indicates that the average students' synthetically evaluation score in the class is 80.07, with a standard deviation of 5.62. As can be seen from the figure, the synthetically evaluation score is left-skewed. Most students get about 85 marks and the number of students around 70 marks is at least.

(3) The Basic statistics analysis of synthetically evaluation score

TABLE 2, it shows that the range of synthetically

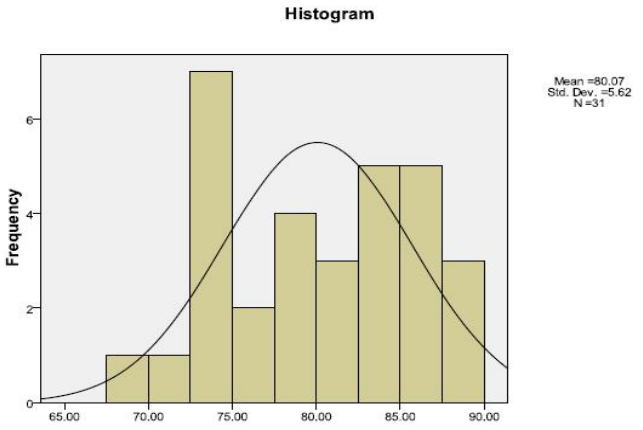

Figure 1: Histogram of the synthetically evaluation score

evaluation scores is 20.55 points, which means that the data is relatively disperse. In addition, the minimum and maximum values of synthetically evaluation score are 68.61 and 89.15, with an average score of 80.07 points and a standard deviation of 5.619. As can be seen from the skewness coefficient that the skewness coefficient is less than 0, with the skewness standard error of 0.42, and therefore the synthetically evaluation scores of the class show a left-skewed distribution. As can be seen from the coefficient of kurtosis, the kurtosis value is less than 0, with a standard error of 0.82, and thus the distribution is gentler than the standard normal distribution. It is called flat-peak distribution.

STATISTIC ANALYSIS AND COMPARISON OF EACH SUBJECT SORES

The above TABLE 3 shows that the range of aerobics is maximum and the range of table tennis is minimum, indicating that the score of aerobics has the highest degree of dispersion, and table tennis's degree of dispersion is the lowest. It has the same situation when check the standard deviation. Among all the subjects, jump scores owns the highest average score and the lowest average score come from the football scores. Only Tai chi's statistics show a right-skewed distribution, and other subjects' results show left-skewed distribution. In addition, among all subjects only aerobics' result has a spike distribution and other subjects show flat peak distribution.

Q-Q PLOT ANALYSIS OF EACH SUBJECT

From the above Figure 2, we can draw a conclu-

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TABLE 2 : The Basic statistics analysis of synthetically evaluation score

project	N	Range	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Synthetically evaluation score	31	20.55	68.61	89.15	80.07	5.619	-.246	.42	-1.06	.82
Valid N (listwise)	31									

TABLE 3 : Statistic Analysis and comparison of the sores of each subject

	N	Range	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
basketball (1)	31	24.00	84.1613	6.96226	-.369	.421	-1.008	.821
football (2)	31	29.00	71.3548	7.36907	-.517	.421	-.306	.821
martial arts (3)	31	39.00	77.4516	11.42173	-.465	.421	-.975	.821
Tai chi (4)	31	28.00	80.9355	8.85413	.005	.421	-1.069	.821
Table tennis (5)	31	16.00	83.4839	4.31177	-.776	.421	-.057	.821
jump (6)	31	30.00	87.2903	8.29535	-.895	.421	-.185	.821
aerobics (7)	31	50.00	79.9677	12.40829	-1.455	.421	2.252	.821
swimming (8)	31	31.00	75.0968	9.64142	-.222	.421	-1.174	.821
badminton (9)	31	25.00	76.3548	8.22414	-.317	.421	-1.291	.821
Valid N (listwise)	31							

sion that, all the subject conform to the normal distribution, apart from a few high mark and low mark points deviate from the normal distribution line slightly.

THE TEST OF EACH SUBJECT

The t-test of the jump score

From the information show in TABLE 4 and TABLE 5 we can know that, among the 31 students' sports scores in the class, the average score is 87.2903, with a standard deviation of 8.29535.The null hypothesis of the average score in this class is no less than 88 points. The double tail probability P-value of the single-sample t-test statistic is 0.637. The 95% confidence interval of the Proportion ensemble average is (-3.7524, 2.3331). If set the significant level of 0.05, since one-tailed test should be carried out, and 0.637 / 2 is greater than significant level, the null hypothesis should not be rejected, and the average sports scores of the class cannot be considered as not significantly higher than 88. At the same time, the fact that 88 points is higher than the lower limit of the 95% confidence interval also confirmed this conclusion.

Gender on football scores of the single factor variance analysis results

TABLE 6 shows the single factor analysis results of gender on the football performance. We can see that the observed variable, football score's sum of squared deviations is 1629.097. If the single-factor impact of gender is considered only, the explained variation of gender is 585.265 among the total variation of the football scores. The variation caused by sampling error is 1043.832, and their variances are 585.265 and 35.994. The result of the division between the two variances reach the F statistic observed value, 16.260. The corresponding probability P-value is approximately zero. If we set significant level of 0.05, consider that the probability P-value is less than the significance level, we should reject the null hypothesis and come to the conclusion that gender has a significant impact on the foot-

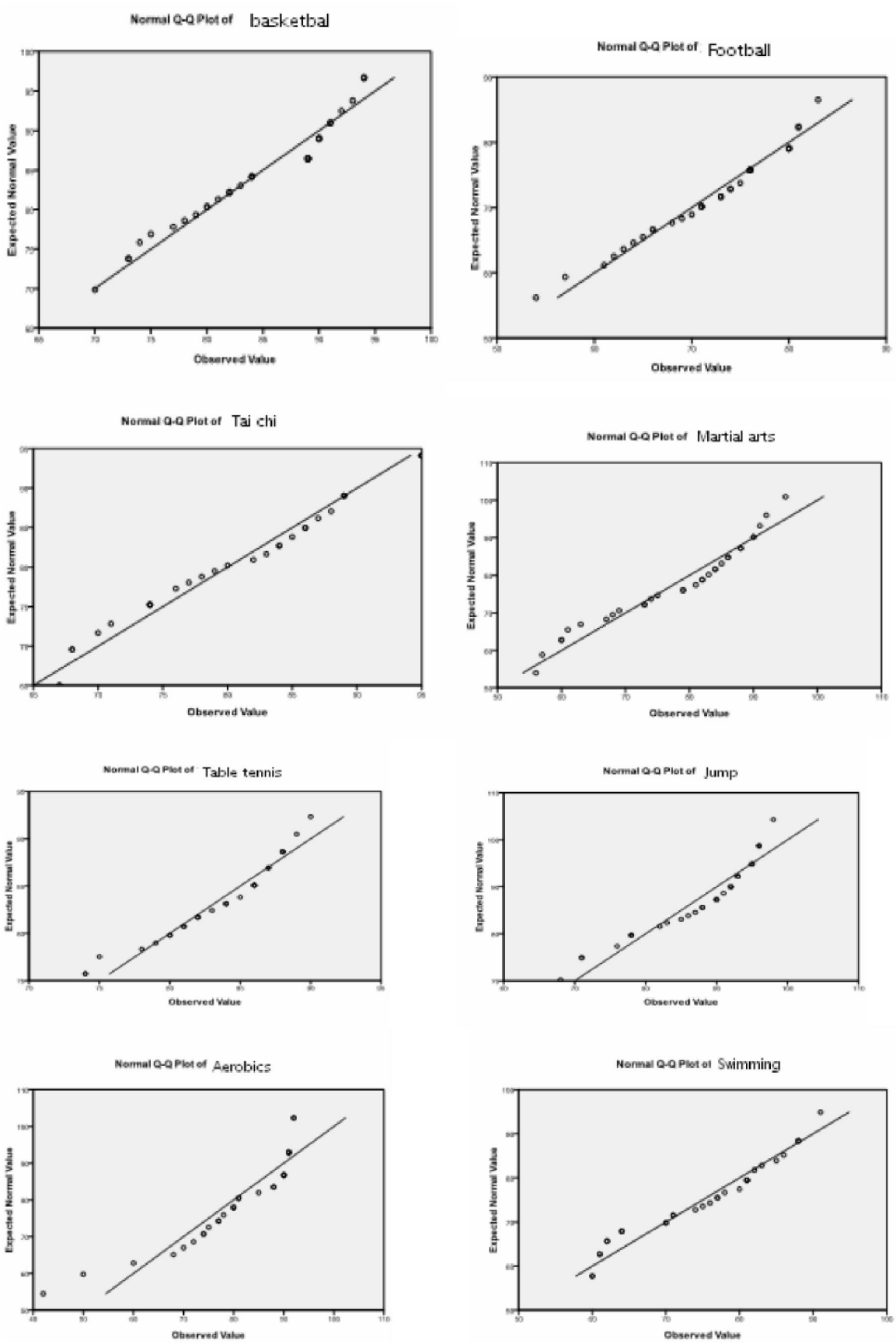

Figure 2 : Q-Q plot analysis of each subject

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ball scores, and the effect of gender on the football scores are not all zero.

TABLE 4 : Basic description statistics of the jump score One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
sports	31	87.2903	8.29535	1.48989

Binomial distribution test of the swim pass rate

From the above TABLE 7 we can see that among the scores of 31 students, 29 pass and 2 fail. The actual ratio of the pass rate is 0.9 and the examination pass rate is 0.9. Due to the small sample size, the test values and observed values are exactly the same, so we consider the swim pass rate of the class reach 90%.

TABLE 5 : The simple sample t-test result of the jump score One-Sample Test

	Test Value = 88					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
jump	-.476	30	.637	-.70968	-3.7524	2.3331

TABLE 6 : Gender on football scores of the single factor variance analysis

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	585.265	1	585.265	16.260	.000
Within Groups	1043.832	29	35.994		
Total	1629.097	30			

THE CORRELATION COEFFICIENTS FOR GRADE POINT AVERAGE SCORES AND SYNTHETICALLY EVALUATION SCORES

TABLE 8 shows that the simple correlation between Grade Point Average scores and synthetically evaluation scores is 0.952, and there is a strong positive corre-

TABLE 7 : Binomial distribution test result of the swim pass rate Binomial Test

		Category	N	Observed Prop.	Test Prop.	Asymp. Sig. (1-tailed)
swimming	Group 1	<= 60	2	.1	.9	.000a,b
	Group 2	> 60	29	.9		
	Total		31	1.0		

a. Alternative hypothesis states that the proportion of cases in the first group < .9.; b. Based on Z Approximation.

TABLE 8 : Result of the correlation coefficients for Grade Point Average scores and synthetically evaluation scores Correlations

		Grade Point Average scores	Synthetically evaluation scores
Grade Point Average scores	Pearson Correlation	1	.952**
	Sig. (2-tailed)		.000
	Sum of Squares and Cross-products	1094.249	969.798
	Covariance	36.475	32.327
	N	31	31
Synthetically evaluation scores	Pearson Correlation	.952**	1
	Sig. (2-tailed)	.000	
	Sum of Squares and Cross-products	969.798	947.406
	Covariance	32.327	31.580
	N	31	31

****. Correlation is significant at the 0.01 level (2-tailed).**

lation between them with the probability of the correlation coefficient test P-value of approximately 1, and both present strong correlation. The two asterisks (**) in upper corner of the correlation coefficient indicates the significance level of 0.01, while one asterisk (*) in the same position shows rejection of the null hypothesis when significance is 0.05. Therefore, a correlation coefficient with two asterisks has more possibility of mistakes than with one when reject the null hypothesis.

CONCLUSION

The article introduces the SPSS software into statistic analysis of PE teaching score, and has a good grasp of the current situation of the students in a variety of sports performance. It provides a basis for teachers to specify new teaching programs scientifically and rationally in the future, and help improve the physical quality and sports level among university students.

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