Correlation Analysis Between the Regular Performance and the Final Performance of College Math Courses

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Abstract. Examination scores is a kind of feedback of the teaching effectiveness, The student's regular performance should be the same as the final performance in the assessment. In this paper, the statistical methods were used to analyze the regular performance and final performance of college math course of different majors and grades, such as Advanced Mathematics, Linear Algebra and Economic Mathematics. The results show that regular performance positively correlates with final performance at most times, indicating that strengthening the students' process management and improving student' regular performance plays a key role in improving students' final performance. Furthermore, this paper analyzes some problems in the regular performance assessment and gives the corresponding solutions.

Keywords: College math · Regular performance · Final performance
Correlation

1 Introduction to the Problems

Math is the crystallization of human wisdom as well as a very important culture. For university students, math is a compulsory basic course for both science & engineering majors and economy & management majors [1, 2]. It is not only an indispensable knowledge tool for major courses, but also the best knowledge carrier for cultivating rational thinking and scientific thinking methods. In addition, it is also an important way to raise the aesthetic awareness of science.

At present, most colleges and universities carry out the comprehensive assessment of process assessment plus final exam over the college math. In other words, the students' final grade is composed of two parts: regular performance and final performance. Regular performance focuses on evaluating the students' learning process and thus evaluating the students' learning effects [3]. The main purpose of implementing the assessment of regular performance is to strengthen the supervision, guidance and management of students' learning process, promote students' independent learning and

improve their overall quality and ability. The final exam mainly assess the overall effect of student' learning, which in a sense also tests the learning process. The assessment of regular performance is in fact consistent with the purpose of final exam. If the same student has good regular performance, his or her ability to acquire practical knowledge will be higher, and the corresponding final exam results will also be good; vice versa. There should be a strong positive correlation between the two assessment methods [4].

The regular performance and final performance is usually distributed according to a certain weight. In general, regular performance accounts for 30%–50% of the total score, while final performance accounts for 70%–50% of the total score. Before launching the course, the teacher will formulate the course assessment method based on the course nature, students' major and students' characteristics, and publish the assessment method and grade assessment method for the students at the beginning of the semester. Although the teacher constantly improves the process assessment method in teaching college math, it is inevitable that subjective, unilateral and unscientific phenomena appear in the process assessment form and the assessment program. In order to form a more objective, scientific and systematic assessment method of regular performance and enable it to correctly reflect and assess the students' learning ability and learning attitude in studying college math, the research on the correlation between regular performance and final performance of college math courses is particularly important [5]. The research on this topic has a profound significance on the evaluative judgment of final performance, the feedback and guidance over teaching, the building of academic atmosphere and the improvement in learning motivation [6].

This paper intends to start from the students as a whole, and study the relationship between regular performance and final performance according to the college math of different grades, different majors and different courses. We would like to draw your attention to the fact that it is not possible to modify a paper in any way, once it has been published. This applies to both the printed book and the online version of the publication. Every detail, including the order of the names of the authors, should be checked before the paper is sent to the Volume Editors.

2   Research Process and Method

2.1   Determining the Research Objects and Research Data

According to the principle of sampling, the grades of Advanced Mathematics (I), Linear Algebra, Economic Mathematics (I) and Economic Mathematics (II) from the majors of Grade 2016's computer science and technology, digital media technology, international economy and trade, financial management, marketing and human resource management are taken as the research objects. Details are shown in Table 1.

Table 1. Sampling results

Major	Computer science and technology	Digital media technology	Business administration	Business administration
Course title	Advanced Mathematics (I)	Linear Algebra	Economic Mathematics (I)	Economic Mathematics (II)
Number of students	62	64	135	300

2.2   Research Method

The charts are used to analyze the distribution of regular performance and final performance, explore whether there is a positive distribution between regular performance and final performance, and compare the distribution curve. Linear regression is used to analyze the correlation between regular performance and final performance, and study whether there is a positive correlation between regular performance and final performance, the correlation degree and the significance of correlation.

2.3   Research Process and Results

After carrying out the normal distribution over the regular performance and final performance of the four courses and making preliminary reasonable judgment over the test scores, the author obtains the frequency histogram and normal distribution curve for the regular performance and final performance, as shown below. Among these, the transverse coordinate represents the score (percentile), and the vertical coordinate represents the function of normal distribution. Besides, the data label on the frequency histogram represents the number of students getting this score. It is shown in Figs. 1, 2, 3, 4, 5, 6, 7 and 8.
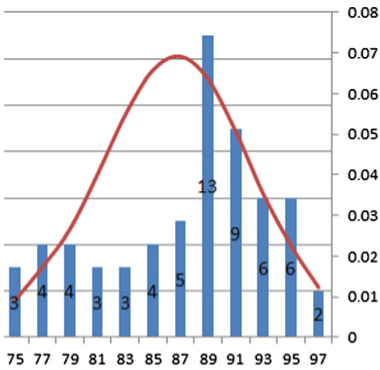

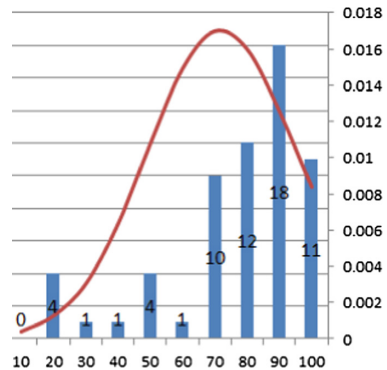**Fig. 1.** Regular performance of Advanced Mathematics (I)
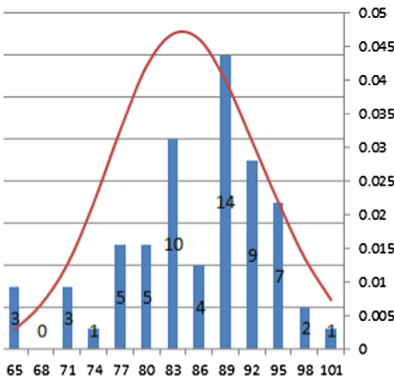

Fig. 2. Final performance of Advanced Mathematics (I)
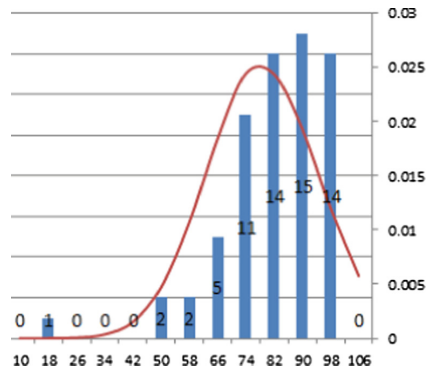

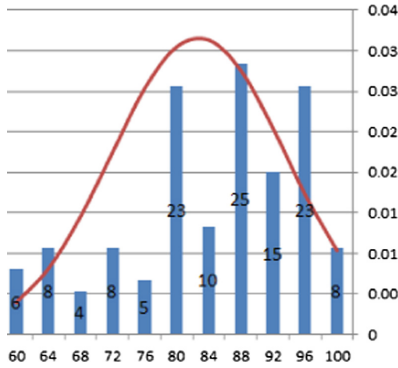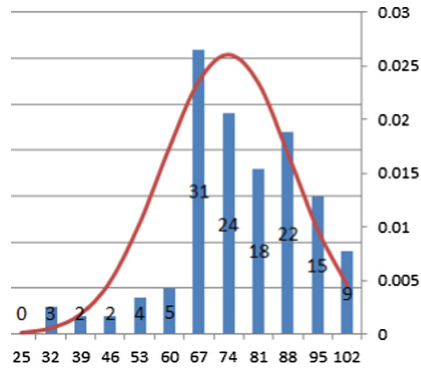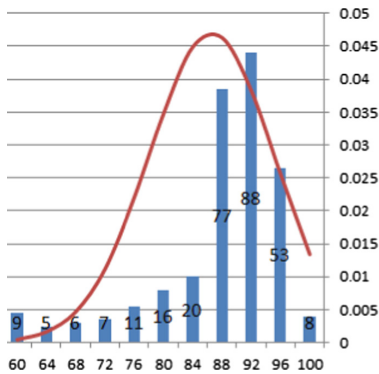**Fig. 3.** Regular performance of Linear Algebra

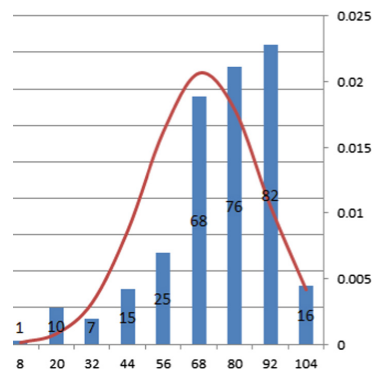**Fig. 4.** Final performance of Linear Algebra

Fig. 5. Regular performance of Economic Mathematics (I)

Fig. 6. Final performance of Economic Mathematics (I)

Fig. 7. Regular performance of Economic Mathematics (II)

Fig. 8. Final performance of Economic Mathematics (II)

If the regular performance and final performance of each course are studied separately, they are basically in line with the normal distribution, so the grade assessment is more reasonable. However, if the regular performance is compared with the final performance of each course, it is found that the final performance is much lower than the regular performance and there is no failure in the regular performance, yet some students may fail the final exam. This shows that process assessment has not really played a role in promoting learning for these students.

Further analysis of the number and proportion of each score section per course, the average score of regular performance and final performance, and standard deviation are as shown in the following Tables 2 and 3.

From the statistics of average score, the average score of regular performance is higher than the average score of final performance. According to the statistics of score section, there are many higher scores in the regular performance and many low scores in the final performance. According to analysis of standard deviation, the regular

Table 2. Number of students in each score section

Course title	Performance category	100–90	89–80	79–70	69–60	<60
Advanced Mathematics (I)	Regular performance	23	28	11	0	0
	Final performance	12	17	13	10	0
Linear Algebra	Regular performance	19	30	12	3	0
	Final performance	16	17	21	5	5
Economic Mathematics (I)	Regular performance	40	45	32	18	0
	Final performance	18	36	33	37	1
Economic Mathematics (II)	Regular performance	124	126	29	21	0
	Final performance	44	60	63	74	9

Table 3. Statistics of average score and standard deviation

Course title	Performance category	Average score	Standard deviation
Advanced Mathematics (I)	Regular performance	87	6
	Final performance	73	23
Linear Algebra	Regular performance	85	8
	Final performance	79	15
Economic Mathematics (I)	Regular performance	83	11
	Final performance	74	15
Economic Mathematics (II)	Regular performance	86	9
	Final performance	69	19

performance has higher concentration than final performance. This shows that the regular performance plays an important role in promoting students' learning to a certain extent. However, for some students and especially those who fail the final exam, they are not well motivated.

The correlation analysis results over the four courses' regular performance and final performance are as shown in the following Table 4.

Table 4. Data of the correlation analysis between the regular and the final performance

Course Title	P-value	Multiple R	R Square	X Variable 1	Intercept
Advanced Mathematics (I)	6.69E−18	0.62	0.39	2.39	−134.63
Linear Algebra	6.32E−11	0.71	0.50	1.29	−30.03
Economic Mathematics (I)	1.07E−32	0.81	0.65	1.13	−19.81
Economic Mathematics (II)	3.75E−86	0.85	0.73	1.90	−94.98

According to statistics, when P-value is less than 0.01, the model can be considered significant at the level of $\alpha = 0.01$ or the confidence level reaches 99%. As can be seen from Table 3, the P values of the four courses are far less than 0.01. Therefore, linear

regression over regular performance and final performance is valid. The value of Multiple R (replaced by r below) is defined as below: r > 0 is a positive correlation and r < 0 is a negative correlation; 0 < |r| < 1 means there is a linear correlation of different degrees: |r| ≤ 0.3 stands for no linear correlation; 0.3 < |r| ≤ 0.5 stands for low linear correlation; 0.5 < |r| ≤ 0.8 for significant linear correlation; |r| > 0.8 for highly linear correlation; |r| = 1 for complete linear correlation. According to Table 3, the regular performance and final performance of Economic Mathematics (I) and Economic Mathematics (II) are highly linearly correlative, and the regular performance and final performance of Linear Algebra and Advanced Mathematics are significantly linearly correlative. This fully shows that the assessment of regular performance and the assessment of final exam actually have the same purpose. Final exam mainly assesses the overall effect of student' learning and assess the learning process in a certain sense as well. Process assessment complements with the final exam.

3 Conclusion and Suggestions

For college math courses, the regular performance statistically positively correlates with the final performance of college math course. It shows that if the regular performance are good, the results of the final exam should also be good, which shows that the regular performance is an important factor affecting students' academic performance, and reflect the true level of students' course learning in a fair and objective manner. Therefore, the teachers should pay more attention to process evaluation in the teaching process.

There are many factors that affect the regular performance. The regular assessment contents include attendance, classroom performance, regular homework, midterm quizzes, teamwork, essays and mathematics modeling practices. In the future research, the assessment method should be further refined to narrow the correlation gap between it and the final performance and reduce the failing rate of final exam.

Through the analysis of interviews with students and teachers, there are some main reasons for the lack of reliability of regular performance for students with the high regular performance and the unsatisfactory and even failed final performance: Some students have poor foundation. Although they pay attention to completing the regular assessment assignments, they fail to really grasp the knowledge. Some students show wrong attitude toward learning, fail to recognize the significance of process assessment, and handle in a slapdash manner; the teacher fails to control strictly. Some students do not pay enough attention to final exam, and fail the final review.

To solve the above problems, the author puts forward the following suggestions for improvement: The teacher shall properly distribute the proportion of regular performance in the future process assessment. The assessment contents, ways and methods should be designed in a more clear and detailed manner. The teacher should also strictly check the whole process assessment, and try to adopt the same standard, in order to reduce the difference and randomness. The teacher shall emphasize students' review of knowledge points, intensify the training efforts of exercises and enhance students' independent learning ability in the whole teaching process.

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