Research on the Relationship between the Scores of Basic Courses and Professional Courses in Colleges and Universities -- Taking Liberal Arts As An Example

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Abstract:

Based on the latest data of students' scores in a university, this paper studies the relationship between the scores of basic courses and professional courses in Colleges and universities. Firstly, canonical correlation analysis is used to qualitatively understand the correlation between basic courses and professional courses, and find out which courses have correlation; Secondly, the common factors of basic courses are extracted by factor analysis to achieve the purpose of dimension reduction and simplification; Finally, through regression analysis, find out the specific correlation between basic courses and professional courses. The results show that there is a close correlation between basic courses and professional courses in Colleges and universities. Among them, College English has the greatest impact on the professional course performance of liberal arts students。

Keywords—**university education, curriculum relationship research, canonical correlation analysis, factor analysis**

I.   INTRODUCTION

For college students, achievement is not only an important standard to measure whether they master professional knowledge and skills, but also an important means to evaluate learning effect and teaching quality. Then, what factors affect students' performance, what is the relationship between students' performance in different courses, and what is the internal relationship between professional courses and basic courses according to the nature of different disciplines, which is not only of great significance to the talent training of the school, but also plays a vital role in students' more solid mastery of professional knowledge.

Ⅱ.   EMPIRICAL ANALYSIS

A. Data Selection and Processing

The data in this paper comes from the summary of 2017's total scores of colleges and universities of a university, which is true, reliable and comprehensive. This paper uses the examination results to represent the students' learning ability of each course. Combined with the nature of the course and the actual situation of the school, this paper selects the representative liberal arts major finance of the school. This major has a large number of students, which increases the sample size and improves the accuracy of the research to a certain extent.

The selection of professional research courses is summarized from two aspects: basic courses and professional courses. For the selection of basic

courses, it mainly selects highly representative public courses such as advanced mathematics, line generation, probability, English and big things that all majors need to learn, so as to make a comparative analysis of the impact of the same courses of all majors on this basis. In addition, targeted basic courses in all majors are added. For the selection of professional courses, combined with the national professional development direction and the importance of courses, several courses are selectively selected, which not only simplifies the analysis of data, but also reduces the impact of errors.

1)Handling of missing values

The data used in this paper are indirect data, which are not obtained through questionnaires, so some data will be missing in the process of data collection. Due to the occurrence of various unknown situations in the student's examination process, such as missing, delaying and cheating, the student's performance in a course will be lost. For this, the method of similar replacement is adopted to deal with the missing value, and find out which course has a significant correlation with the missing value. Among them, there is a missing value in probability theory and mathematical statistics, However, there is no missing value in advanced mathematics 2, and there is a significant linear correlation between them. Their distributions are similar and obey the normal distribution. After ranking according to the scores of advanced algebra 2, linear fitting prediction is used to supplement the missing scores of probability theory and mathematical statistics, and so on.

2)Duplicate data processing

Due to reasons such as retake and make-up examination, a student may have multiple scores in the same course, which is very common and unavoidable. Therefore, corresponding processing shall be carried out to prevent repeated data from affecting the analysis results. For the data selection principle, this paper uniformly adopts the first score as the student's final score, but if there are phenomena such as cheating and delaying the examination, the second score is selected as the final score (and so on in other cases), and checked in combination with the student's other course scores. If the make-up examination score is basically true, it will be retained, and if it is not true, the corresponding weight will be adjusted.

3)Consistency processing

Some courses have different teachers in different classes, resulting in certain differences in the standards for correcting test papers, resulting in differences in scores. For such cases, it is necessary to standardize them, eliminate the dimensions between variables and make the data comparable.

B. Data Analysis of Liberal Arts Finance

1)Canonical correlation analysis

This paper analyzes the basic courses and professional courses of students majoring in finance in University A. through correlation analysis, it can be seen that there is a significant correlation between the scores of students majoring in finance, so it is meaningful to analyze the scores of students majoring in finance. Through canonical correlation analysis, the canonical correlation coefficients of basic courses and professional courses are obtained, as shown in Table 1 and table 2. Therefore, we can obtain the expression of typical variables under canonical correlation analysis:

$U = -0.046*C\ language -0.254* College\ English -0.216* Advanced\ Mathematics -0.347\ Linear\ Algebra$

$-0.008* Probability\ Theory\ and\ Mathematical\ Statistics -0.136* College\ English -0.18\ Macroeconomics -0.168\ Microeconomics$

$V = -0.232* Accounting -0.187* Financial\ Engineering -0.056* Financial\ Economics\ 0.073\ Commercial\ bank\ operation\ and\ management$

$-0.089* Political\ Economy -0.081\ Econometrics -0.322\ Finance -0.082\ Insurance -0.261\ Songsi\ Finance -01012* International\ Finance$

Variable	1
The C language	-.046
The university English	-.254
Higher mathematics	-.216
College Chinese	-.136
Linear algebra A	-.347
C. Macroeconomics B	-.008
	-.180
Microeconomics A	-.168

Variable	1
Accounting A	-.232
Financial engineering	-.187
Financial economics	-.056
Commercial bank management	.073
political economy	-.089
Econometrics A	-.081
Finance	-.322
Insurance	-.082
Corporate Finance A	-.261
The international financial	-.012

Table 1 set 1 standardized canonical correlation coefficientTable 2 set 1 standardized canonical correlation coefficient

The dependent variable group has a high degree of correlation with typical related variables. In the independent variable group, except for College Chinese, probability theory and mathematical statistics, other independent variables have a strong correlation with typical variables. U and V respectively reflect the learning ability of basic courses and professional courses of students majoring in finance in University a, because the typical correlation coefficient is as high as 0.872 and passed the significance test, Therefore, we can explain that there is an important correlation between the two types of indicators. As can be seen from table 1, the variance ratios explained by typical variables in independent variable group and dependent variable group are 0.356 and 0.418 respectively. They affect each other, but basic courses have a greater impact on professional courses.

Table 3 proportional interpretation of variance

Canonical Variable	Set 1 by Self	Set 1 by Set 2	Set 2 by Self	Set 2 by Set 1
1	0.469	0.356	0.550	0.418
2	0.062	0.024	0.078	0.031
3	0.075	0.019	0.064	0.016
4	0.066	0.015	0.044	0.010
5	0.066	0.008	0.049	0.006
6	0.086	0.005	0.039	0.002
7	0.093	0.002	0.049	0.001
8	0.084	0.000	0.035	0.000

2）Factor nalysis

In order to study the specific relationship between professional courses and basic courses, factor analysis is carried out to extract the common factors of basic courses. It is found that when the number of common factors extracted is 4, it is more reasonable. At this time, the commonality of all variables is high and the information loss of each variable is less, Their cumulative variance contribution rate, that is, these four factors account for 81.984% of the impact on the scores of all basic courses, and the total variance of about 81.984% can be explained by these four potential factors.

The common factor is extracted and rotated to make the factor have naming interpretability. As can be seen from table 4, the first factor mainly explains the five variables of C language, College English, advanced mathematics, linear algebra and microeconomics, which can be interpreted as the learning ability of algorithmic logic; The second factor can be explained as macroeconomic learning ability; The third factor can be explained as Chinese learning ability; Probability theory and mathematical statistics have a high load on the fourth factor, which

can be explained as the learning ability of problem analysis. The meaning of the factor is clearer than that before rotation.

Table 4 composition matrix after rotation [a]

	ingredients			
	1	2	3	4
C language	0.577	0.373	0.171	0.315
College English	0.885	-0.196	0.467	0.031
Advanced mathematics	0.845	0.294	-0.038	0.153
Linear algebra (A)	0.796	0.344	-0.080	0.115
Probability theory and mathematical statistics (C)	0.193	0.063	0.038	0.967
College Chinese	-0.015	0.207	0.933	0.045
Macroeconomics (B)	0.310	0.861	0.216	0.062
Microeconomics (A)	0.804	0.188	-0.021	0.159

a. The rotation has converged after 7 iterations

3）Regression analysis

The extracted common factors of basic courses are regressed with each professional course in turn, and the relevant conclusions are drawn: accounting is mainly affected by C language, English, advanced mathematics, line generation, microeconomics and macroeconomics, among which C language, English, advanced mathematics, line generation and microeconomics have the greatest impact; Political economics is mainly influenced by C language, English, advanced mathematics, line generation, microeconomics and Chinese, among which C language, English, advanced mathematics, line generation and microeconomics have the greatest influence; Financial engineering, finance, corporate finance and international finance are mainly influenced by C language, and Chinese, among which C language, English, advanced mathematics, line generation and microeconomics have the greatest influence; Commercial bank management, econometrics and insurance are mainly influenced by C language, English, advanced mathematics, line generation, microeconomics, Chinese and probability theory, among which C language, English, advanced mathematics, line generation and microeconomics have the greatest influence; The two professional courses of financial economics are mainly influenced by C language, English, advanced mathematics, line generation, microeconomics, macroeconomics, Chinese and probability theory, among which the most influential are C language, English, advanced mathematics, line generation and microeconomics. The regression models of basic course scores to professional course scores are as follows:

$$accounting = 5.872fi + 3.216 f + 73.478$$

$$Financial\ Engineering = 7.466\ fi + 1.642f + 1.612f；+ 79.927$$

$$Financial\ Economics = 5.931f；+ 2.99\ f + 2.03\ f；+ 2.496\ f4 + 72.131$$

$$Operation\ and\ management\ of\ commercial\ banks = 5.06f + 1.792\ f；+ 2.746f + 72.355$$

$$political\ economics = 2.967fi + 1.194\ f；+ 92.214$$

$$Econometrics = 7.341f + 2.744\ fs + 2.115\ f + 79.35$$

$$Finance = 5.666\ fi + 3.82\ f + 1.8\ 9\ 4\ f：+ 7\ 6.4\ 3\ 5$$

$$Insurance = 4.824\ f + 2.709\ f；+ 2.592\ f + 82.199$$

Corporate finance =9.505f;+ 3.593 f+ 2.536 f；+ 71.125

international finance =5.768fi+2.232 f+3.319f:+ 72.896

To sum up, the academic performance of students majoring in finance is inseparable from the learning of basic courses, among which the learning ability of C language, English, advanced mathematics, line generation and microeconomics has the greatest impact, followed by the learning ability of Chinese, and the learning ability of macroeconomic and probability theory can not be ignored. From this promotion, we can get the general law of the relationship between basic courses and professional courses of liberal arts majors, that is, there is a close relationship between the scores of professional courses and basic courses of liberal arts students. The learning of professional courses is inseparable from the learning of solid basic courses, especially the learning of programming language, mathematics and economics.

□. CONCLUSIONS

A.The Influence Between Liberal Arts Basic Courses and Professional Courses

For liberal arts majors, there is also a significant correlation between the common factors extracted from basic courses and professional courses, which largely affects the performance of professional courses. Combined with the coefficient proportion of principal components, it is concluded that the most influential basic course is college English. There is a close relationship between basic courses and professional courses, and students' performance is that the higher the basic courses, the higher the professional courses, and the lower the basic courses, the lower the

2)It is different from science and engineering to strengthen the learning duration of language basic courses such as English and Chinese and

professional courses. Relevant conclusions are as follows:

1)Programming is a very important basic course, and its influence even goes beyond English learning. It plays a vital role in the establishment of learning ability and logical thinking. This conclusion is also in line with the development trend of today's society.

2)Mathematics has a great impact on professional courses, but in comparison, the impact of liberal arts is lower than that of science and engineering. There are significant differences between liberal arts and science and engineering. In addition to paying equal attention to mathematics, we pay more attention to the accumulation of English and Chinese.

3)For the learning of mathematics courses, liberal arts majors reduce the learning ability of probability theory and mathematical statistics, which is due to its less impact on the learning of professional courses.

B. Suggestions on Liberal Arts Curriculum Design

In view of the relationship between basic courses and professional courses of liberal arts specialty, combined with the conclusions of empirical analysis, this paper provides the following suggestions for the curriculum arrangement of liberal arts specialty in Colleges and universities in China:

1)Consistent with science and engineering, it is necessary to increase the arrangement time of mathematics courses, but one small difference is that it can

appropriately weaken the importance of probability theory and mathematical statistics.

ensure the continuity with the curriculum arrangement of professional courses.

3)We should reasonably set up basic courses in our professional field.

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