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# Evaluation Study on Professional Theory Course in the University Based on the Factor Analysis

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**Abstract:** Based on the professional theory course evaluation of partial scores of 30 teachers done by the supervisions, the study uses SPSS software and the factor analysis method to evaluate the quality of teachers' professional theory teaching and finds out the key effect factor of evaluating teaching quality. Then the study puts forward some countermeasures to improve the teaching level of teachers and evaluate t scientifically the teachers' teaching quality.

**Keywords:** Evaluation, factor analysis, supervision, university

## INTRODUCTION

With the continuous expansion of the enrollment scale of higher education, it is an urgent problem to be solved how to promote the overall harmonious development of higher education and improve the quality of higher education in recent years. The construction of "quality engineering" is one of major measures which are taken to deepen the reform of undergraduate teaching and improve teaching quality of undergraduate course in a new period (Li *et al*., 2010). Many experts and scholars had done a lot of effective research on the construction of evaluation system of teaching quality in colleges and corresponding research methods. At the same time, influencing factors of quality about teaching system are numerous; the evaluation of teaching is difficult. Zhang (2012) thought that teaching evaluation was one of important links which are indispensable to guarantee teaching quality in colleges and universities and a goal-oriented principle is the most basic principles of teaching evaluation, which occupied an important place in the teaching evaluation. Bai *et al*. (2012) conducted a research on the construction of a comprehensive evaluation system of College teaching from the evaluation purpose and principle, evaluation subjects and content, evaluation index system and feedback of results and other aspects. Yu (2012) put forward the algorithm suitable for mining association rules under relational database frequent item sets, which were applied to teaching evaluation data mining. And he drew some potential relevant information, which would provide decision making for teaching management. Wang (2012) applied data mining technology in the evaluation of teachers, where all critical data can be identified from the teaching content, teaching methods, teaching attitude, qualifications and titles to mining and other related information, so as to improve a better teaching method application and the overall quality of teaching.

However, as a newly-built local undergraduate college, on the one hand, we should study advanced management methods outside, on the other hand, we should be aware of our own characteristics to determine a reasonable evaluation system, which can promote increased levels of management. Since 2011, the teaching supervisions in college have achieved full coverage for hospital teaching of every semester in order to further improve the quality of personnel training and improve and perfect the teaching quality evaluation and control system, that is, the teaching supervision has to listen to a lesson at least for each teacher and has a comprehensive grasp of the teacher's classroom teaching situation.

This study mainly regards the evaluation data which are taken by the school supervisions on the part of teachers' professional theory's lesson in class as a sample, uses the SPSS software for the analysis of data, extracts the factor of larger variance contribution rate as a representative, comprehensively analyze and scientifically evaluate the quality of teaching, which can provide some valuable advice for teachers to improve their teaching level and the future improvement of teaching evaluation indicators of the school.

## THE EVALUATION INDEX SYSTEM

The supervisors' evaluation form of the professional theory lessons in our school is mainly divided into five aspects and 13 observations, including teaching content, teaching methods, teaching, teaching skills and teaching effectiveness and the observations in detail are shown in Table 1:

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Table 1: The evaluation index system

| Observations | Weight (%) | No |
|---|---|---|
| Clear, specific teaching objectives, educational content that meets the syllabus requirements. | 10 | $X_1$ |
| Full preparation before class (teaching files, equipment etc.), class on time. | 5 | $X_2$ |
| Familiar teaching contents, brighter viewpoint, rich content, correct knowledge. | 10 | $X_3$ |
| Clear teaching emphasis, effective treatment of difficulty. | 10 | $X_4$ |
| Standard Mandarin, lively and refined language expression, moderate volume, moderate speed | 10 | $X_5$ |
| Appropriate selection of teaching content, a large amount of classroom | 10 | $X_6$ |
| To pay attention to inspire students thinking and associative, attach importance to students' ability training | 6 | $X_7$ |
| Arousing the students ' emotions, moderate two-way communication between teachers and students, good interactive effect | 6 | $X_8$ |
| Topics (a project, task, or case) as the carrier, worked closely with the actual contact | 6 | $X_9$ |
| Auxiliary means of teaching ( teaching media, writing etc.) can optimize teaching and effectively improve teaching efficiency | 7 | $X_{10}$ |
| Students are actively engaged in learning, and teaching effects are good. | 5 | $X_{11}$ |
| The attendance rate of the students | 5 | $X_{12}$ |
| Overall impression of hearing people in this class | 10 | $X_{13}$ |

Table 2: The standardized data

| No | $ZX_1$ | $ZX_2$ | $ZX_3$ | $ZX_4$ | $ZX_5$ | $ZX_6$ | $ZX_7$ | $ZX_8$ | $ZX_9$ | $ZX_{10}$ | $ZX_{11}$ | $ZX_{12}$ | $ZX_{13}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.905 | 0.776 | 1.146 | 0.463 | 0.132 | 0.183 | 2.108 | 1.565 | 1.807 | 1.801 | 2.556 | -0.24 | 1.408 |
| 2 | 0.905 | 0.776 | -0.417 | 0.463 | 1.45 | 2.008 | 0.068 | 1.565 | 1.807 | 0.257 | -0.183 | 1.109 | 1.408 |
| 3 | 0.905 | 0.776 | 1.146 | 0.463 | 0.132 | 2.008 | 0.068 | 1.565 | 1.807 | 0.257 | 2.556 | -0.689 | 1.408 |
| 4 | 0.905 | -0.194 | 1.146 | 0.463 | 1.45 | 2.008 | 2.108 | 0.447 | -0.361 | 0.257 | -0.183 | 0.21 | 1.408 |
| 5 | 0.905 | -0.194 | -0.417 | 0.463 | 1.45 | 0.183 | 0.068 | 1.565 | -0.361 | 0.257 | -0.183 | 1.109 | 1.408 |
| 6 | 0.905 | 0.776 | 1.146 | 0.463 | 1.45 | 0.183 | 0.068 | -0.671 | -0.361 | 0.257 | -0.183 | 1.109 | 1.408 |
| 7 | 0.905 | 0.776 | 1.146 | 0.463 | -1.186 | -1.643 | 2.108 | 1.565 | 1.807 | 1.801 | -0.183 | -0.689 | 1.408 |
| 8 | 0.905 | -1.164 | 1.146 | 0.463 | 1.45 | 0.183 | 0.068 | 1.565 | -0.361 | 0.257 | -0.183 | 0.21 | 1.408 |
| 9 | 0.905 | 0.776 | -0.417 | 0.463 | 0.132 | 0.183 | 0.068 | 0.447 | -0.361 | 0.257 | -0.183 | 0.21 | 1.408 |
| 10 | -0.101 | 0.776 | -0.417 | 0.463 | 1.45 | 0.183 | 0.068 | 0.447 | -0.361 | -1.287 | -0.183 | 0.659 | -0.512 |
| 11 | -1.106 | 0.776 | -1.98 | 0.463 | -1.186 | 0.183 | 0.068 | 0.447 | -0.361 | 1.801 | -0.183 | 1.109 | -0.512 |
| 12 | 0.905 | -1.164 | 1.146 | 0.463 | 1.45 | 0.183 | 0.068 | 0.447 | -0.361 | -1.287 | -0.183 | 0.21 | -0.512 |
| 13 | 0.905 | 0.776 | -0.417 | -1.521 | -1.186 | 0.183 | 0.068 | -0.671 | -0.361 | 0.257 | -0.183 | 1.109 | -0.512 |
| 14 | -1.106 | 0.776 | -0.417 | 0.463 | -1.186 | -1.643 | 0.068 | 0.447 | -0.361 | 1.801 | -0.183 | 0.21 | -0.512 |
| 15 | 0.905 | 0.776 | -0.417 | 0.463 | 0.132 | 0.183 | -1.972 | -0.671 | -0.361 | -1.287 | -0.183 | 1.109 | -0.512 |
| 16 | -1.106 | -0.194 | 1.146 | 0.463 | 0.132 | 0.183 | 0.068 | -0.671 | 1.807 | 0.257 | 2.556 | -2.488 | -0.512 |
| 17 | -1.106 | -2.135 | -0.417 | 2.447 | 0.132 | 0.183 | 0.068 | 0.447 | -0.361 | 0.257 | -0.183 | 0.21 | -0.512 |
| 18 | 0.905 | -1.164 | -0.417 | 0.463 | 0.132 | 0.183 | 0.068 | 0.447 | -0.361 | -1.287 | -0.183 | 0.21 | -0.512 |
| 19 | -1.106 | 0.776 | 1.146 | 0.463 | -1.186 | 0.183 | 0.068 | -0.671 | -0.361 | -1.287 | -0.183 | 0.21 | -0.512 |
| 20 | -1.106 | 0.776 | -0.417 | 0.463 | 0.132 | 0.183 | 0.068 | -0.671 | -0.361 | 0.257 | -2.921 | -0.689 | -0.512 |
| 21 | -1.106 | -1.164 | 1.146 | 0.463 | 0.132 | 0.183 | 0.068 | -0.671 | -0.361 | 0.257 | -0.183 | -0.689 | -0.512 |
| 22 | 0.905 | -0.194 | -0.417 | 0.463 | -1.186 | 0.183 | 0.068 | -0.671 | -0.361 | 0.257 | -0.183 | -1.589 | -0.512 |
| 23 | 0.905 | -2.135 | -0.417 | -1.521 | 0.132 | 0.183 | 0.068 | -0.671 | -0.361 | -1.287 | -0.183 | 1.109 | -0.512 |
| 24 | -1.106 | -0.194 | -0.417 | -1.521 | -1.186 | 0.183 | 0.068 | -0.671 | 1.807 | -1.287 | -0.183 | -0.689 | -0.512 |
| 25 | -1.106 | 0.776 | -0.417 | -1.521 | -1.186 | 0.183 | -1.972 | -0.671 | -0.361 | 0.257 | -0.183 | -0.689 | -0.512 |
| 26 | -1.106 | 0.776 | -1.98 | -1.521 | 0.132 | -1.643 | -1.972 | -0.671 | -0.361 | -1.287 | -0.183 | 1.109 | -0.512 |
| 27 | -1.106 | -2.135 | 1.146 | 0.463 | 0.132 | 0.183 | 0.068 | -0.671 | -0.361 | 0.257 | -0.183 | -1.589 | -0.512 |
| 28 | -1.106 | -0.194 | -1.98 | -1.521 | -1.186 | -1.643 | 0.068 | -1.789 | -0.361 | 0.257 | -0.183 | 1.109 | -0.512 |
| 29 | -1.106 | 0.776 | -0.417 | -1.521 | -1.186 | -1.643 | 0.068 | -0.671 | -0.361 | -1.287 | -0.183 | -1.589 | -0.512 |
| 30 | 0.905 | -0.194 | -0.417 | -1.521 | 0.132 | -1.643 | -1.972 | -1.789 | -2.53 | 0.257 | -0.183 | -0.689 | -2.432 |

Table 3: Correlation matrix

| Correlation | $X_1$ | $X_2$ | $X_3$ | $X_4$ | $X_5$ | $X_6$ | $X_7$ | $X_8$ | $X_9$ | $X_{10}$ | $X_{11}$ | $X_{12}$ | $X_{13}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $X_1$ | 1.000 | 0.013 | 0.282 | 0.117 | 0.470 | 0.335 | 0.219 | 0.434 | 0.038 | 0.027 | 0.171 | 0.287 | 0.479 |
| $X_2$ | 0.013 | 1.000 | -0.188 | -0.173 | -0.238 | -0.086 | -0.055 | 0.090 | 0.218 | 0.207 | 0.055 | 0.132 | 0.218 |
| $X_3$ | 0.282 | -0.188 | 1.000 | 0.414 | 0.341 | 0.374 | 0.469 | 0.313 | 0.312 | 0.111 | 0.364 | -0.418 | 0.400 |
| $X_4$ | 0.117 | -0.173 | 0.414 | 1.000 | 0.388 | 0.412 | 0.386 | 0.551 | 0.173 | 0.299 | 0.087 | -0.039 | 0.377 |
| $X_5$ | 0.470 | -0.238 | 0.341 | 0.388 | 1.000 | 0.473 | 0.083 | 0.396 | -0.049 | -0.175 | 0.025 | 0.278 | 0.419 |
| $X_6$ | 0.335 | -0.086 | 0.374 | 0.412 | 0.473 | 1.000 | 0.244 | 0.408 | 0.341 | -0.049 | 0.207 | 0.074 | 0.459 |
| $X_7$ | 0.219 | -0.055 | 0.469 | 0.386 | 0.083 | 0.244 | 1.000 | 0.519 | 0.483 | 0.416 | 0.206 | -0.110 | 0.576 |
| $X_8$ | 0.434 | 0.090 | 0.313 | 0.551 | 0.396 | 0.408 | 0.519 | 1.000 | 0.502 | 0.357 | 0.296 | 0.163 | 0.755 |
| $X_9$ | 0.038 | 0.218 | 0.312 | 0.173 | -0.049 | 0.341 | 0.483 | 0.502 | 1.000 | 0.212 | 0.546 | -0.224 | 0.526 |
| $X_{10}$ | 0.027 | 0.207 | 0.111 | 0.299 | -0.175 | -0.049 | 0.416 | 0.357 | 0.212 | 1.000 | 0.194 | -0.104 | 0.341 |
| $X_{11}$ | 0.171 | 0.055 | 0.364 | 0.087 | 0.025 | 0.207 | 0.206 | 0.296 | 0.546 | 0.194 | 1.000 | -0.258 | 0.266 |
| $X_{12}$ | 0.287 | 0.132 | -0.418 | -0.039 | 0.278 | 0.074 | -0.110 | 0.163 | -0.224 | -0.104 | -0.258 | 1.000 | 0.200 |
| $X_{13}$ | 0.479 | 0.218 | 0.400 | 0.377 | 0.419 | 0.459 | 0.576 | 0.755 | 0.526 | 0.341 | 0.266 | 0.200 | 1.000 |

## DATA PROCESSING PROCEDURE

The author chooses 30 evaluation forms of professional theory course, which have been graded by the school supervisions, in which all persons are ranked

Table 4: KMO and bartlett's test

| | | |
|---|---|---|
| Kaiser-Meyer-Olkin measure of sampling adequacy | | 0.708 |
| Bartlett's test of sphericity | Approx. chi-square | 151.464 |
| | df | 78 |
| | Sig | 0.000 |

Table 5: Total variance explained

| | Initial Eigen values | | | Extraction sums of squared loadings | | | Rotation sums of squared loadings | | |
|---|---|---|---|---|---|---|---|---|---|
| Component | Total | % of variance | Cumulative % | Total | % of variance | Cumulative % | Total | % of variance | Cumulative % |
| 1 | 4.343 | 33.407 | 33.407 | 4.343 | 33.407 | 33.407 | 2.841 | 21.857 | 21.857 |
| 2 | 2.051 | 15.778 | 49.185 | 2.051 | 15.778 | 49.185 | 2.528 | 19.448 | 41.305 |
| 3 | 1.636 | 12.582 | 61.767 | 1.636 | 12.582 | 61.767 | 2.185 | 16.806 | 58.111 |
| 4 | 1.174 | 9.032 | 70.798 | 1.174 | 9.032 | 70.798 | 1.649 | 12.687 | 70.798 |
| 5 | 0.810 | 6.232 | 77.031 | | | | | | |
| 6 | 0.661 | 5.084 | 82.115 | | | | | | |
| 7 | 0.644 | 4.955 | 87.070 | | | | | | |
| 8 | 0.464 | 3.570 | 90.640 | | | | | | |
| 9 | 0.354 | 2.726 | 93.367 | | | | | | |
| 10 | 0.328 | 2.520 | 95.887 | | | | | | |
| 11 | 0.215 | 1.656 | 97.543 | | | | | | |
| 12 | 0.171 | 1.315 | 98.858 | | | | | | |
| 13 | 0.149 | 1.142 | 100.000 | | | | | | |

by score from big to small. In this study, the software of SPSS17.0 is used for data analysis.

**To standardize the raw data:**

$$ZX_{ij} = \frac{x_{ij} - \overline{x}_j}{s_j} \quad i = 1, 2, \cdots, n;\ j = 1, 2, \cdots, p \tag{1}$$

where,

$$\overline{x}_j = \frac{\sum_{i=1}^{n} x_{ij}}{n}, s_j^2 = \frac{\sum_{i=1}^{n} \left(x_{ij} - \overline{x}_j\right)^2}{n-1}$$

The standard matrix $ZX$ will be obtained via formula (1):

$$ZX_i = \left\{ZX_{i1}, ZX_{i2}, ZX_{i3}, \cdots ZX_{ij}\right\}$$

where,

$$i = 1, 2, 3, \cdots, n;\ j = 1, 2, 3, \cdots, p$$

Above procedure steps can be completed via the software of SPSS17.0 and the standardized data can be shown in Table 2.

**To find the correlation coefficient matrix:** The correlation coefficient matrix can be easily found via the software of SPSS and indicates the coefficient relation between the variables, which is shown in Table 3.

**To take KMO and Bartlett's Test of the correlation coefficient matrix:** Specific test results are shown in Table 4. And we can know that the result of KMO's Test is 0.708, which is bigger than 0.5 and indicates that the data sample is eligible for factor analysis. More ever, the value of Sig in the Bartlett's test is 0.000, which is smaller than 0.05 and indicates that all variables are not independent (Luo and Yang, 2010).

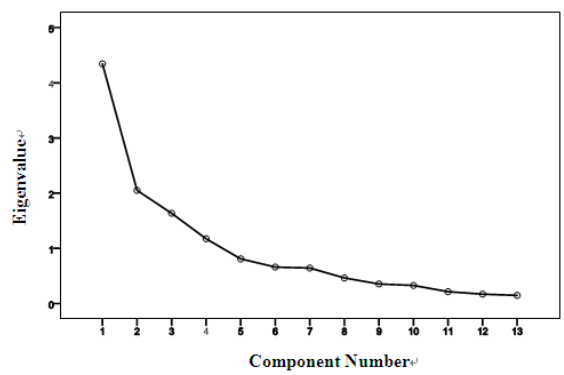


Fig. 1: Scree Plot

**To extract the main factors via the principal component method:** The principal component method is used to extract the main factors, whose specific information is shown in Table 5. As can be seen from Table 5, the value of the first main factor 4.343, whose corresponding variance contribution rate is 33.407%? And the cumulative variance contribution rate of the four main factors is up to 70.798%. According to the conditions of that the value of extracting factor eigenvalue must be greater than 1; we eventually extract 4 main factors to replace the original 13 observation points, which can basically reflect the basic circumstances of the research. The Scree Plot is shown in Fig. 1, in which the all eigenvalue is arranged in accordance with value in descending order. As can be seen from the Fig. 1, the first four principal factor eigenvalue is above 1.

**To obtain the component score coefficient matrix:** A component score coefficient matrix can be obtained via the rotation method of Varimax with Kaiser's normalization, which is shown in Table 6.

**To determine the linear combination of four main factors:** Suppose $y_1$,$y_2$,$y_3$,$y_4$ represents four main factors, we can get the linear combination of four main factors, that is to say, $y_1$, $y_2$, $y_3$, $y_4$ can be expressed respectively as linear combinations.

Table 6: Component score coefficient matrix

| | Component | | | |
|---|---|---|---|---|
| | 1 | 2 | 3 | 4 |
| $X_1$ | 0.306 | -0.108 | 0.024 | 0.097 |
| $X_2$ | 0.013 | 0.012 | 0.107 | 0.496 |
| $X_3$ | 0.022 | -0.002 | 0.211 | -0.306 |
| $X_4$ | -0.008 | 0.327 | -0.197 | -0.278 |
| $X_5$ | 0.319 | -0.097 | -0.089 | -0.167 |
| $X_6$ | 0.238 | -0.117 | 0.130 | -0.088 |
| $X_7$ | -0.070 | 0.312 | -0.004 | -0.071 |
| $X_8$ | 0.133 | 0.212 | -0.025 | 0.085 |
| $X_9$ | -0.004 | -0.016 | 0.376 | 0.162 |
| $X_{10}$ | -0.213 | 0.471 | -0.147 | 0.085 |
| $X_{11}$ | 0.029 | -0.179 | 0.455 | 0.076 |
| $X_{12}$ | 0.263 | 0.013 | -0.294 | 0.288 |
| $X_{13}$ | 0.174 | 0.144 | 0.040 | 0.161 |

Table 7: The score of the main factor, total score and rank

| NO | $\hat{F}_1$ | $\hat{F}_2$ | $\hat{F}_3$ | $\hat{F}_4$ | F | Rank |
|---|---|---|---|---|---|---|
| 1 | 0.32 | 1.58 | 1.92 | 0.74 | 0.79 | 1 |
| 2 | 1.89 | 0.38 | 0.31 | 1.03 | 0.67 | 3 |
| 3 | 1.11 | -0.01 | 2.53 | 0.46 | 0.73 | 2 |
| 4 | 1.39 | 0.79 | 0 | -0.78 | 0.36 | 5 |
| 5 | 1.45 | 0.62 | -0.85 | 0.36 | 0.34 | 6 |
| 6 | 1.2 | 0.15 | -0.36 | 0.17 | 0.25 | 8 |
| 7 | -0.73 | 2.41 | 0.69 | 0.78 | 0.52 | 4 |
| 8 | 1.23 | 0.59 | -0.36 | -0.86 | 0.22 | 9 |
| 9 | 0.66 | 0.51 | -0.34 | 0.7 | 0.28 | 7 |
| 10 | 0.88 | -0.51 | -0.46 | 0.07 | 0.03 | 12 |
| 11 | -0.84 | 1.32 | -1.17 | 1.29 | 0.04 | 11 |
| 12 | 1.08 | -0.65 | -0.18 | -1.4 | -0.1 | 16 |
| 13 | 0.01 | -0.51 | -0.14 | 1.33 | 0.05 | 10 |
| 14 | -1.48 | 1.52 | -0.81 | 0.71 | -0.07 | 15 |
| 15 | 0.88 | -1.36 | -0.41 | 0.57 | -0.07 | 14 |
| 16 | -1.06 | -0.36 | 2.65 | -1.07 | 0.01 | 13 |
| 17 | -0.35 | 1.07 | -1.16 | -1.8 | -0.29 | 24 |
| 18 | 0.63 | -0.52 | -0.39 | -0.7 | -0.12 | 17 |
| 19 | -0.5 | -0.39 | 0.24 | -0.28 | -0.18 | 20 |
| 20 | -0.76 | 0.7 | -1.42 | -0.36 | -0.31 | 25 |
| 21 | -0.67 | 0.18 | -0.05 | -1.6 | -0.32 | 26 |
| 22 | -0.73 | 0.09 | 0.16 | -0.48 | -0.18 | 19 |
| 23 | 0.72 | -1.4 | -0.34 | -0.47 | -0.23 | 21 |

$$y_1 = 0.306ZX_1+0.013ZX_2+0.022ZX_3-0.008ZX_4+0.319ZX_5+0.238ZX_6-0.070ZX_7+0.133ZX_8-0.004ZX_9-0.213ZX_{10}+0.029ZX_{11}+0.263ZX_{12}+0.174ZX_{13} \quad (2)$$

$$y_2 = -0.108ZX_1+0.012ZX_2-0.002ZX_3+0.327ZX_4-0.097ZX_5-0.117ZX_6+0.312ZX_7+0.212ZX_8-0.016ZX_9+0.471ZX_{10}-0.179ZX_{11}+0.013ZX_{12}+0.144ZX_{13} \quad (3)$$

$$y_3 = 0.024ZX_1+0.107ZX_2+0.211ZX_3-0.197ZX_4-0.089ZX_5+0.130ZX_6-0.004ZX_7-0.025ZX_8+0.376ZX_9-0.147ZX_{10}+0.455ZX_{11}-0.294ZX_{12}+0.040ZX_{13} \quad (4)$$

$$y_4 = 0.097ZX_1+0.496ZX_2-0.306ZX_3-0.278ZX_4\ 0.167ZX_5-0.088ZX_6-0.071ZX_7+0.085ZX_8+0.162\ ZX_9+0.085ZX_{10}+0.076ZX_{11}+0.288ZX_{12}+0.161ZX_{13} \quad (5)$$

where,

$ZX_i$ = The standardized data corresponding to the variable $X_i$:

i = 1, 2, …, 13

**To calculate the total score of main factor and total score:**

$$F = \frac{\alpha_1}{\sum_{i=1}^{n}\alpha_i} \times \hat{F}_1 + \frac{\alpha_2}{\sum_{i=1}^{n}\alpha_i} \times F_2 + \cdots \frac{\alpha_n}{\sum_{i=1}^{n}\alpha_i} \times F_n \quad (6)$$

where,

$\hat{F}_1$ = The score of the main factor ***i***

$\alpha_i$ = The variance weight of the main factor ***i***

i = 1, 2, 3, 4

F = The score of the comprehensive evaluation;

According to the formula (2), (3), (4), (5), we can obtain the **t**otal score of main factor. Then via the formula (6), the score of the comprehensive evaluation can be calculated, which is shown in Table 7.

## ANALYSIS OF THE RESULTS

As can be seen from Table 7, the first factor in $X_1$, $X_5$, $X_6$, $X_{12}$, $X_{13}$ loads on a greater and it mainly reflects the teaching objectives, teaching content, Mandarin and language expression, interaction between teachers and students, the overall impression of the lesson of student and lectures by. The second factor in $X_4$, $X_7$, $X_8$, $X_{10}$ loads on a greater and it mainly reflects the teaching difficulty and the ability training of students and the teaching means of two-way communication, use of auxiliary means of teaching and inspires the student to ponder. The third factor is mainly decided by $X_9$, $X_{11}$ and it primarily reflects subjects as the carrier, close links with the actual students in active learning and teaching effectiveness. The fourth factor in $X_2$, $X_3$ loads on a larger and the $X_3$ is negatively correlated; the fourth factor mainly reflects the preparation situation of lessons work.

## COUNTERMEASURES

According to above statistical data and the analysis of the results, some countermeasures can be put forward:

**Teachers should pay enough attention to the theoretical teaching in the attitude:** Before every class, teachers should control the syllabus, clear teaching objectives, organize teaching content. At the same time, the emphasis of teaching should be clear; treatment of difficulty should be effective; the amount of the course information should be larger and specialized course also contact the discipline frontier. Teachers should introduce the relevant knowledge of the latest developments, promote students' active learning and strengthen the communication between teachers and students to get good interaction (Zhang and Zhu, 2011).

**Teachers should strive to improve their own quality, enhance the charisma:** On one hand, teachers should regularly participate in the training and exchange of learning and discipline to master the most cutting-edge knowledge. If teachers are enclosed in a single school environment for a long time, their knowledge will be single and limited knowledge imparts useful component. And most students dislike the single teaching method from books to books, which may also be one of the reasons why some students like skipping or weariness. On the other hand, while teachers impart professional knowledge, they are displaying their charisma to the students. Not only can the noble charisma enable students to be conscious of self-education, self-reflection, but also it can promote health, freedom, the vividly development of the student.

**To improve and implement a strict attendance system of classroom:** The classroom is the main place for students to learn and classroom learning is one of the main channels for students to obtain knowledge, improve ability and quality. For the universities, it is a major initiative to improve the quality of classroom teaching, further standardize the order of teaching and strengthen teaching management.

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