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Research on the teaching reform of management courses based on the students' ability structure

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ABSTRACT

The teaching reform of management courses is an important topic in the process of raising management talents of higher education. According to the training objectives and occupation post requirements of management courses, we established the corresponding evaluating index system of the students' ability structure. After the questionnaire investigated, we made the comprehensive measurement by the factor analysis method and detected it with the SPSS statistical software. Through an analysis of the results of the model, we can get the real relationship between the teaching reform of management courses and the students' ability structure clearly, based on this, we put forward the suggestions to the teaching reform of management courses to enhance students' comprehensive ability.

KEYWORDS

Teaching reform; Management courses; Student' ability; Student' ability structure; Course reform.

INTRODUCTION

There are two stages of cultivating management professionals: firstly, with the activities of theory teaching, the students can get the rational knowledge structure required in the economic management activities; secondly, with the activities of practice teaching, the students will gain knowledge internalization of various skills needed to engage in economic management activities.

According to the training objectives and occupation post requirements of management courses, with the following four difficulties: be lack of enlightening of situational teaching means and thinking innovation; be difficult to meet the requirements of the progress of teaching tool for teaching; be not strong of students' learning initiative, practical ability and innovation; be lack of the actual combat of practical projects, we should reengineer the course content, reconstruct the teaching methods and innovate the teaching model, implement the teaching reform of management courses with the aim of raising the students' ability, let the students connect the social zero distance, enhance the teaching and studying initiation, improve the students' ability of combination of theory and practice.

The main existing research results of teaching reform are as follow: Anderson L M studied the educational psychology for teachers and proposed that we should reform our courses, rethinking our roles;[1] Liu Fengtai introduced the teaching quality project of China's education vitalization action program and proposed to attach the laboratory and experimental teaching;[2] Zhang Xuejun studied the reform of experimental teaching all-roundly with the aim at cultivating students' innovative abilities;[3]Yang Honglin and Wang J analyzed the serious problem that existed in teaching content, teaching method, teaching means and teaching mode of higher mathematics and put forward the corresponding train of thought of the reform;[4,5] Wang Yukuo studied on the teaching reform and development of physical education in higher vocational colleges;[6] Mou Lianjia researched the practice on computer basic teaching reform for non -computer majors in higher education and put forward several suggestion to improve the teaching effect s and teaching quality.[7]

STUDENTS' ABILITY STRUCTURE MODEL OF HIGHER EDUCATION

There is a balance between the campus life and social career for the higher education students. Besides the professional knowledge ability and skill ability, the student should also have the occupation accomplishment ability, self cognitive ability, environment cognitive ability and decision cognitive ability. Through the above analysis, we established the evaluating and appraising system of the students' ability structure model in higher education containing 6 aspects of 19 specific indicators, which is shown in Figure 1.

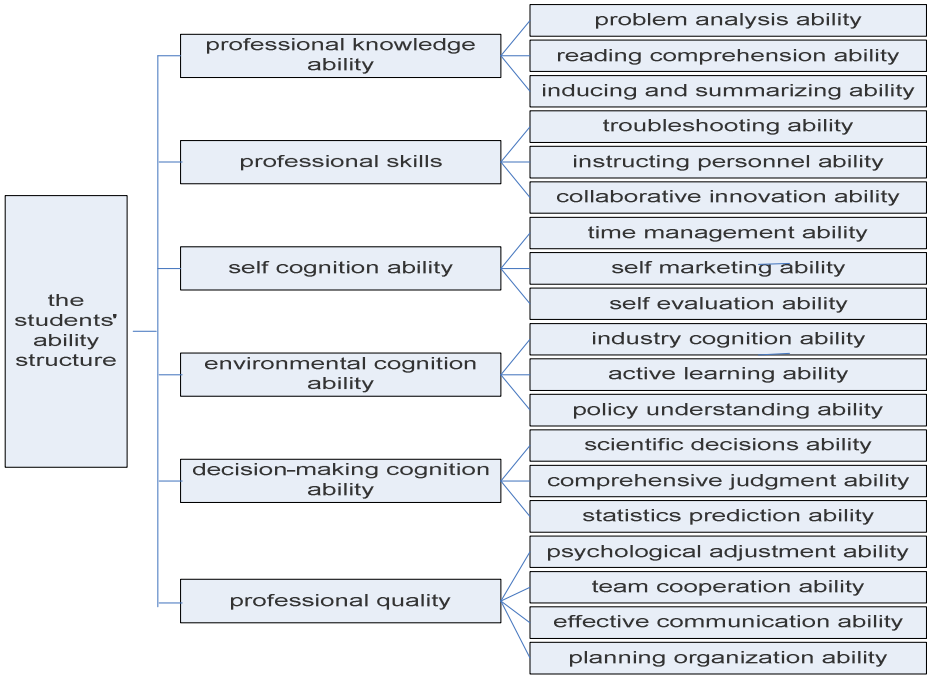

Figure 1 : The evaluating system of the students' ability structure

EVALUATION OF THE STUDENTS' COMPREHENSIVE ABILITY

In the process of the implementation of evaluation, according to the index of the instructions, we randomly surveyed 350 students majoring in management by questionnaire and recovered 337 valid questionnaires(effective recovery rate is 96.3%). Finally, using the factor analysis method for comprehensive measurement of its.

The basic principle of the factor analysis method

The factor analysis method is a method, which can change the original various indicators into few unrelated (or independent) comprehensive indexes. Its basic theories are described as follows:

A measured sample $\overline{x_i} = \begin{bmatrix} x_{1i} & x_{2i} & \ldots & x_{pi} \end{bmatrix}^T (i = 1, 2, \cdots, n)$, which contains n codes and the dimension of each code is p. If we want to classify the sample, it often involves the following four step operation.

Calculate the average value and covariance matrix of sample. The formula of the average value and covariance matrix of sample are shown below:

$$\bar{x} = \frac{1}{n}\sum_{i=1}^{n} x_{1i} = \begin{bmatrix} \frac{1}{n}\sum_{i=1}^{n} x_{1i} \\ \frac{1}{n}\sum_{i=1}^{n} x_{2i} \\ \cdots \\ \frac{1}{n}\sum_{i=1}^{n} x_{pi} \end{bmatrix} = \begin{bmatrix} \bar{x}_1 \\ \bar{x}_2 \\ \cdots \\ \bar{x}_p \end{bmatrix} \frac{n!}{r!(n-r)!}$$

$$\hat{\sum} = \frac{n}{n-1}\sum_{i=1}^{n}(x_i - \bar{x})(x_i - \bar{x})' = \begin{bmatrix} \frac{1}{n-1}\sum_{i=1}^{n}(x_{1i} - \bar{x}'_1)^2 & \frac{1}{n-1}\sum_{i=1}^{n}(x_{1i} - \bar{x}'_2)(x_{2i} - \bar{x}'_2) & \cdots & \frac{1}{n-1}\sum_{i=1}^{n}(x_{1i} - \bar{x}_1)(x_{pi} - \bar{x}_p) \\ \frac{1}{n-1}\sum_{i=1}^{n}(x_{2i} - \bar{x}_2)(x_{1i} - \bar{x}'_1) & \frac{1}{n-1}\sum_{i=1}^{n}(x_{2i} - \bar{x}_2)^2 & \cdots & \frac{1}{n-1}\sum_{i=1}^{n}(x_{2i} - \bar{x}_2)(x_{pi} - \bar{x}_p) \\ \cdots & \cdots & \cdots & \cdots \\ \frac{1}{n-1}\sum_{i=1}^{n}(x_{pi} - \bar{x}_p)(x_{1i} - \bar{x}_1) & \frac{1}{n-1}\sum_{i=1}^{n}(x_{pi} - \bar{x}_p)(x_{2i} - \bar{x}_2) & \cdots & \frac{1}{n-1}\sum_{i=1}^{n}(x_{pi} - \bar{x}_p) \end{bmatrix}$$

Solving the equation. Assumed that the λ_1 and λ_2 are the maximum root and the secondary root of the equation $Q = |\hat{\sum}_{pXP} - \lambda I_{pXP}|$, whose assignment are equal to the greatest characteristic root and secondary characteristic root of matrix of $\hat{\sum}$.

The solution of equations. If we want to standard the solved solution y of the below equations, we can get the feature vectors according to the greatest characteristic root and secondary characteristic root of matrix of $\hat{\sum}$, named $(a)^{(1)}$ and $(a)^{(2)}$.

$$\begin{cases} (\hat{\sum}_{pxp} - \lambda_1 I_{pxp})y = 0 \\ (\hat{\sum}_{pxp} - \lambda_2 I_{pxp})y = 0 \end{cases}$$

$$(a)^{(1)} = \frac{y}{\sqrt{y'y}} = \begin{bmatrix} (a)_1^{(1)} \\ (a)_2^{(1)} \\ \cdots \\ (a)_p^{(1)} \end{bmatrix}$$

$$(a)^{(2)} = \frac{y}{\sqrt{y'y}} = \begin{bmatrix} (a)_1^{(2)} \\ (a)_2^{(2)} \\ \cdots \\ (a)_p^{(2)} \end{bmatrix}$$

Calculate the two main factors of sample. Based on the above sample, we can calculate its two main factors shown below. It will be n two-dimensional point (z_{1i}, z_{2i}) appearing in the plane rectangular coordinate system.

$$\begin{cases} Z_{1i} = a^{(1)}{}' x_i = \sum_{k=1}^{p} a_k{}^{(1)} x_{ki} \\ Z_{2i} = a^{(2)}{}' x_i = \sum_{k=1}^{p} a_k{}^{(2)} x_{ki} \end{cases} (i = 1, 2, 3...n)$$

The establishment of the model

According to the 19 variables in the evaluation system of the higher education students' ability, we can give their comprehensive index shown below:

$$\begin{cases} z_1 = l_{11}x_1 + l_{12}x_2 + \cdots + l_{1p}x_{1p} \\ z_2 = l_{21}x_1 + l_{22}x_2 + \cdots + l_{2p}x_p \\ \quad \cdots \\ z_m = l_{m1}x_1 + l_{m2}x_2 + \cdots + l_{m1}x_p \end{cases} (m = 19, p = 19)$$

$z_1, z_2, \cdots\cdots z_m$ are the first, second,……m principal component of the variables $x_1, x_2, \cdots\cdots, x_p$, which corresponds to the 19 variables in the evaluation system of the higher education students' ability. The purpose of finding the principal component is to determine the load variables $l_{ij}(i = 1, 2, ..., m,\ \ j = 1, 2, ..., p)$.

The correlation coefficients matrix. According to the relation among $x_j(j = 1, 2, ..., p)$, we can write data correlation coefficients matrix formula shown below.

$$R = \begin{bmatrix} r_{11} & r_{12} & \cdots & r_{1p} \\ r_{21} & r_{22} & \cdots & r_{2p} \\ \cdots & \cdots & \cdots & \cdots \\ r_{p1} & r_{p2} & \cdots & r_{pp} \end{bmatrix}$$

r_{ij} can be calculated in the following formula.

$$r_{ij} = \frac{\sum_{k=1}^{n} (x_{ki} - \bar{x}_i)(x_{kj} - \bar{x}_j)}{\sqrt{\sum_{k=1}^{n} (x_{ki} - \bar{x}_i)^2 \sum_{k=1}^{n} (x_{kj} - \bar{x}_j)^2}}$$

The solution of the characteristic equation. Usually we calculate the eigenvalues of the characteristic equation $|\lambda I - R| = 0$ with the method called *Jacobi* and descend the calculated results shown as $0 \le \lambda_p \le \cdots \le \lambda_2 \le \lambda_1$, then we can calculate principal component contribution rate and accumulated contribution rate.

The principal component z_i contribution rate and accumulated contribution rate can be described as below.

$$\frac{\lambda_i}{\sum_{k=1}^{p} \lambda_k} (i = 1, 2 \cdots, p)$$

$$\frac{\sum_{k=1}^{i} \lambda_k}{\sum_{k=1}^{p} \lambda_k} (i = 1, 2 \cdots, p)$$

Generally the accumulative contribution rate of the eigenvalues $\lambda_1, \lambda_2, \cdots, \lambda_m$ equals to 85-95% , which can be the first, second, $m(m \le p)$ principal component.

According to the index of the 6 aspects of the students' ability structure model in higher education, we can get each factor index $GNH(x_i)$, shown below.

$$GNH(x_i) = \frac{Xi - X\min}{X\max - X\min}$$

The variance contribution rate ω_i are normalized as the weight of the formula (SAIHE means the students' ability structure model in higher education), shown below.

$$\text{SAIHE}=\text{fac1}\times\omega_1 + fac2\times\omega_2 + fac3\times\omega_3 + fac4\times\omega_4 + fac5\times\omega_5 + fac6\times\omega_6$$

Notes: fac1 means professional knowledge ability; fac2 means professional skills; fac3 means self cognition ability ;fac4 means environmental cognition ability; fac5 means decision-making cognition ability; fac6 means professional quality.

The solution of the model

Based on the data of the questionnaire, with the analysis of correlation, $Bartlett s$ spherical test and index standardization, we can make factor analysis on it, the eigenvalues, variance contribution rate, the accumulative contribution rate of which are shown in TABLE 1.

TABLE 1 : The factor loading matrix of SAIHE

factor	Eigenvalues ($*10^2$)	variance contribution rate(%)	accumulative contribution rate(%)
professional knowledge ability	12.37	33.53	33.53
professional skills	8.26	22.39	55.92
decision-making cognition ability	7.2	19.52	75.44
professional quality	3.9	10.57	86.01
environmental cognition ability	2.44	6.62	92.63
self cognition ability	2.72	7.37	100.00

According to the principle that the eigenvalues are greater than three, we select the four main factors, the accumulated variance contribution rate of which is equal to 86.01%; with the variance contribution rate normalized as the weight set $\omega = (0.3898, 0.2603, 0.2270, 0.1229)$, We can get the descending dimension formula of SAIHE shown below.

$$\text{SAIHE}=\text{fac1}\times\omega_1 + fac2\times\omega_2 + fac5\times\omega_5 + fac6\times\omega_6$$

Through calculation, SAIHE was 71.52%, the results showed that the questionnaire survey of the students' ability in higher education was in the middle level.

CONCLUSIONS

In order to solve the management students "grandiose aims but puny abilities", the teaching reform of management courses is to improve students' ability, which takes the student development and learning as the core; let the students learn the methods and skills of knowledge, rather than simply impart knowledge, which can be as the basic teaching objective, the highest goal is developing the students cognition ability and professional quality hidden the courses behind.

Moving recognizing the importance of teaching results to paying attention to the process of teaching, establishing research and training awareness. Therefore, we need to strengthen the construction of teachers' team, striving to cultivate double division type of teachers, adjusting the teaching plan and curriculum system, playing the effect of laboratory, changing teaching methods, advocating the concept of project teaching, aiming at improving the students' professional knowledge and ability and professional skills.

Moving the monotonous rational preaching to optimizing teaching situation, establishing the situational optimization consciousness. Therefore, we need to strengthen the cooperation with enterprises and institutions, creating more students practical base, providing students with more practice opportunities, hosting colorful student club activities such as debate, group interview without leader, aiming at improving the students' self cognition ability and environmental cognition ability.

Moving simply imparting knowledge to cultivating students' comprehensive ability, establishing the overall development goal consciousness. Therefore, we need to increase the proportion of practice courses, strengthening the students' experimental and engineering learning, playing the role of the platform resources of occupation planning and

psychological health guidance, opening such as business simulation decision (BOSS) competition and management related professional seminars, aiming at improving the students' decision-making cognition ability and professional quality.

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