

The Comprehensive Evaluation of Non-intellectual Factors in Quality-oriented Education

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Abstract. This article adopts the theory of system engineering and fuzzy mathematics. Making the subjective concept transform into the quantitative standard, establish the comprehensive evaluation model of non-intelligence factors in quality-oriented education, and apply this model to specific analysis of quality-oriented education in colleges and universities. We select five factors of the non-intelligence factors that are closely related to the equality-oriented education. Results show that the comprehensive evaluation model can accurately and scientifically reflect the level of non-intelligence factors of the assessed object. It provides scientific guidance for evaluation and enables educators to develop students' abilities with the evaluation results.

1. Introduction

Improving the quality-oriented of college students is a requirement for the development of contemporary college students. Quality-oriented education includes intellectual and non-intellectual factors. Intellectual knowledge includes many aspects, such as intellectual base, general intelligence, etc. Non-intelligence factors can be divided into broad sense and narrow sense[1]. In a broad sense, the non-intelligence factor refers to all subjective factors outside of intelligence, including the ideological and political view, view on life values, moral discipline, and psychological factors such as emotion, will, personality character. In the narrow sense, it refers to emotion, mood, personality and other psychological factors. The non-intelligence factor is the important driving force of college students in learning activities; it is also an important factor in the development of college students, which plays an important role in the development of the students' mind. The cultivation of students' non-intellectual factors is an indispensable part of moral education in universities, which is conducive to the overall development of students' intelligence factors[2, 3]. At present, there are many scientific methods for evaluating intellectual factors, such as standardized tests, etc. However, the evaluation of non-intelligent factors still adopts the fuzzy concept. There is no quantitative description, such as excellent, good and no scientific system theory. In practice, we adopt the theory of system engineering and fuzzy mathematics. The evaluation model of the intelligence factor of education was established, and we have applied it to the quality-oriented education effects analysis in our hospital.

2. The establishment of the evaluation model of non-intelligent factors

Quality-oriented education involves many aspects, such as academic achievement, all kinds of ability, moral values, basic specialized knowledge and creative ability, ability to adapt to society and so on. It is not immutable, thus forming a multi-index dynamic system[4]. We quantify the various factors in the dynamic system of description, and get the relative weights of each factor and the threshold of change of the entire model which can evaluate the non-intelligence factors of quality-oriented education[5, 6].

According to the actual requirements, we choose five basic factors from related factors of quality-oriented education: students, teachers, department team, cadres, school, forming pass class time relationship shown in Fig. 1.

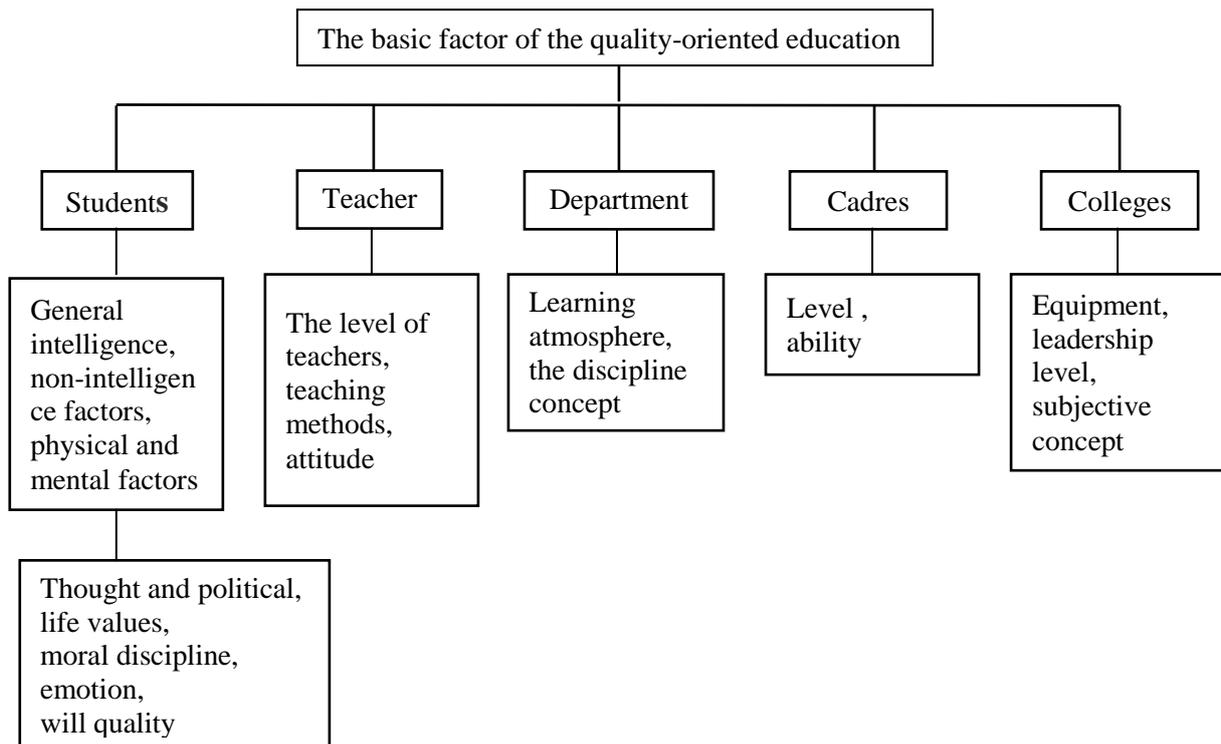


Figure 1. The basic factor of the quality-oriented education.

We can see from Fig. 1, the level of quality-oriented education is mainly composed of students, teachers and departments. It can be seen from the actual situation that the weight of the trainees and teachers is greater among these five basic factors. Therefore, the student is the main body in the quality education, which is the most important in the basic factor of quality-oriented education. And the three factors: general intelligence, non-intelligence factor and physical and mental quality play a big role in the student factor. According to our analysis, non-intelligence factors account for a large proportion of the weight, so non-intellectual factors play a very important role in the training of students.

The following evaluation model can be obtained by quantifying the five basic factors:

$$\bar{\omega}^* = \varnothing^*(x_1, x_2, x_3, x_4, x_5) \quad (1)$$

They are the primary factor: trainees, teachers, departments, cadres, colleges.

Due to the five basic factor weighting differently in the quality-oriented education, students and the teachers have a larger weight, therefore in practice formula 1 can be further simplified, and the evaluation system can be obtained as follows:

$$\bar{\omega} = \bar{\varnothing}(x_1, x_2) \quad (2)$$

Among them, x_1 is the student and x_2 is the teacher.

With random sampling data, the response of formula (2) and formula (1) is not significantly different at 0.05 level. After practical application, the efficiency is up to 94%.

3. Determination of the weight vector of non-intellectual factors

According to the actual situation of our hospital, and the experience we got in the process of carrying out quality-oriented education, we chose the following five main factors in the study of non-intelligence factors: the ideological and political, life value and moral discipline, emotion, will quality.

Analyze the five factors above and after comparison, the following interval evaluation matrix can be obtained:

$$A = (a_{ij}^M, a_{ij}^N) = \begin{bmatrix} (1,1) & (4/3, 6/5) & (2/3, 1/2) & (1, 5/3) & (1, 5/3) \\ (2/5, 2/3) & (1,1) & (1/4, 1/2) & (1/3, 1) & (1/3, 1) \\ (2,2) & (2,4) & (1,1) & (8/3, 3) & (8/3, 3) \\ (3/5, 1) & (1,3) & (1/3, 3/8) & (1,1) & (1,1) \\ (3/5, 1) & (1,3) & (1/3, 3/8) & (1,1) & (1,1) \end{bmatrix} \quad (3)$$

We can find the weight vector of A^0 by using the dot product method:

$$\omega^0 = (0.2, 0.1, 1, 0.4, 0.15, 0.15)'$$

Getting the weight vector of A^M :

$$\omega^M = (0.176, 0.092, 0.4920, 0.188, 0.1880)'$$

It's the weight vector of A^N :

$$\omega^N = (0.2346, 0.1338, 0.3718, 0.1299, 0.1299)'$$

With the formula we get the weight vector of each factor of the non-intelligence system:

$$\omega = (0.2001, 0.1026, 0.3940, 0.1515, 0.1516)'$$

4. Fuzzy comprehensive evaluation model of non-intelligent factors and the case study

There are n factors, and the diagnosis of each factor is divided into m evaluation level. The data comes from s times evaluation. We get the following evaluation matrix:

$$B = \begin{bmatrix} a_{11} & a_{12} & \cdots & a_{1m} \\ a_{21} & a_{22} & \cdots & a_{2m} \\ \vdots & \vdots & \ddots & \vdots \\ a_{n1} & a_{n2} & \cdots & a_{nm} \end{bmatrix} \quad (4)$$

Determine the weight of each factor and get the weight vector: $\omega = (\omega_1, \omega_2, \dots, \omega_n)'$. The above can be equal to the matrix S :

$$S = \omega' B = (\omega_1, \omega_2, \dots, \omega_n) \begin{bmatrix} a_{11} & a_{12} & \cdots & a_{1m} \\ a_{21} & a_{22} & \cdots & a_{2m} \\ \vdots & \vdots & \ddots & \vdots \\ a_{n1} & a_{n2} & \cdots & a_{nm} \end{bmatrix} = (b_1, b_2, \dots, b_m) \quad (5)$$

Further quantification can be achieved through the following hierarchical assignment function:

$$F = (f_1, f_2, \dots, f_m)'$$

So the total score of evaluation is: $SF = \sum_{i=1}^m b_i f_i$

The non-intellectual factors of an object can be evaluated by observing its behavior under normal conditions.

Table 1. Ten times observation records.

	Excellent	Good	General	Poor	Very bad
Thoughts And Morals	6	2	2	0	0
Life Values	4	4	1	1	0
Moral Law	5	2	3	0	0
Emotion	5	2	3	0	0
Will Quality	4	2	3	1	0

As shown in table 1, the fuzzy comprehensive evaluation model based on the 10 times observation of non-intellectual factors of a research object is applied to the evaluation matrix:

$$\mathbf{B} = \begin{bmatrix} 0.6 & 0.2 & 0.2 & 0 & 0 \\ 0.4 & 0.4 & 0.1 & 0.1 & 0 \\ 0.5 & 0.2 & 0.3 & 0 & 0 \\ 0.5 & 0.2 & 0.3 & 0 & 0 \\ 0.4 & 0.2 & 0.3 & 0.1 & 0 \end{bmatrix}$$

Based on the weight vectors of each factor that have been obtained:

$$\omega = (0.2001, 0.1026, 0.3940, 0.1515, 0.1516)$$

Get the hierarchical matrix of non-intellectual factors:

$$S = \omega' B = (0.4946, 0.2205, 0.2595, 0.2542, 0)$$

After giving the content to every level, calculate the total score of non-intellectual factors:

$$SF = (0.4946, 0.2205, 0.2595, 0.2542, 0) * [2, 1, 0, -1, -2]^T = 0.995$$

It shows that the non-intellectual factors of the subject are at an excellent level.

For different evaluated object, with comprehensive evaluation model, it has different evaluation results. Through the application of the non-intelligence factor evaluation model, we can scientifically evaluate the level of non-intellectual factors, so as to provide the guidance of the scientific basis for evaluation.

5. Conclusion

Quality-oriented education takes improving national quality as its fundamental purpose, to develop the students' ideological and moral qualities, social science, labor skills quality, psychological quality, and achieve a comprehensive and harmonious development of students' personalities. The five factors of the non-intelligence factors that we selected are closely related to the objective of the quality education, so the scientific evaluation of non-intelligent factors is very meaningful. We put forward the evaluation method, making fuzzy subjective concept into quantitative standard, to reflect more accurately object's level of non-intelligence factors, let educators can use the evaluation results, recognize the educatee's non-intelligence level, so as to cultivate educatees more effectively in all kinds of quality and promote the all-round development of quality-oriented education.

6. References

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