

THE APPLICATION OF AHP TO EVALUATE TEACHER'S PERFORMANCE IN CHINA

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(I) Introduction

Evaluating a teacher's performance is of great significance to improve teaching quality and teaching management level. Especially in our country there is a special significance of evaluating teacher's title. At the present time in evaluating the titles there is no scientific method and an objective standard to follow in evaluating the level of teacher's. So it is often the case that opinions vary each stresses on his own strong point. Pester with the leaders and it is really hard for anyone to make a decision. If their contradictions can not be solved to the satisfactory of every one it will eventually bring loss to work and spoil one's feelings. In order to change this situation, we must learn to evaluate the titles scientifically and reasonably. Therefore we adopted a method called "AHP" which can better reflect the speciality of man's judgement and design an easy evaluating model that is convincible.

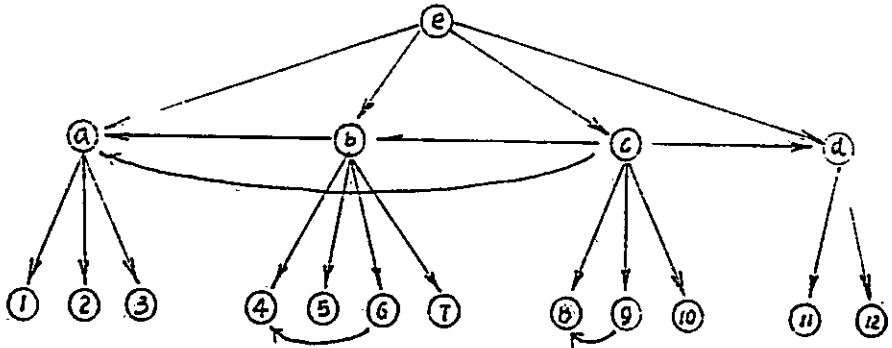
As you know there are a lot of complex factors to influence the teaching level. So that the appraised problem may be composed of a complex system. This paper determines the factors of a teacher's performance and establish the hierarchic system with innerdependence. By [2] we have obtain the priorities of alternatives with respect to the overall goal.

(II) Structure of the Evaluation System

In order the influences of people's preferences on the result of decision are decreased. We adopt the Delphi's method, when the criteria of the system are determined. We gave sixteen criteria and establish the system, with innerdependence within the components of a level.

There is dependence among the four criteria. There is also dependence among the alternatives with respect to each criteria. However, the criteria do not depend on the alternatives.

The System is illustrated in Figure 0



(Figure 0)

The goal, criteria and alternatives are defined as follows.

Goal (e), Standard of teaching.

Criteria (a), Attitude towards teaching work.

(b), Teaching and guidance.

(c), Teaching result.

(d), Scientific research.

Alternatives

- (1) The mastering of teaching materials.
- (2) Preparing lessons well or not.
- (3) Teaching and educating.
- (4) The ability of organizing lectures.
- (5) The depth and width of teaching material and proficiency.
- (6) Teaching method which can arouse student's interest.
- (7) Guidance and answering question.
- (8) Student's interest in the subject they are learning.

- (9) The range of improvement of different levels of students
- (10) Student's ability in teaching themselves and putting theory into practice.
- (11) Are there any thesis papers on teaching research ?
- (12) Are there any scientific thesis papers ?

We denote the impact role of the element i with respect to j in a step by $W_{i,j}$ ($i, j = a, b, c, d, e, l, z, \dots, 12$). If the impact role is not, then, it is denoted by 0. The method of calculation is as follow,

If i and j are not at the same level, such as $W_{1,2}, W_{2,1}, W_{3,1}$ denote the weight vectors that they are obtained through pairwise comparison for the elements 1, 2, 3 under the criteria a . If i and j are at the same level, such as, $W_{a,c}, W_{b,c}, W_{c,e}, W_{d,c}$ denote the weight vectors that they are obtained through pairwise comparison for elements a, b, c, d , under the criteria C .

Thus we have,

$$W_{L(2),e} \equiv (W_{a,e} \ W_{b,e} \ W_{c,e} \ W_{d,e})^T = (0.16, 0.36, 0.39, 0.09)^T$$

$$W_{L(3),a} \equiv (W_{1,a} \ W_{2,a} \ W_{3,a})^T = (0.382, 0.344, 0.284)^T$$

$$W_{L(3),b} \equiv (W_{4,b} \ W_{5,b} \ W_{6,b} \ W_{7,b} \ W_{7,b})^T = (0.153, 0.323, 0.303, 0.221)^T$$

$$W_{L(3),c} \equiv (W_{6,c} \ W_{9,c} \ W_{10,c})^T = (0.253, 0.391, 0.356)^T$$

$$W_{L(3),d} \equiv (W_{11,d} \ W_{12,d})^T = (0.6, 0.4)^T$$

$$W_{L(2)} \equiv \begin{bmatrix} W_{a,a} & W_{a,b} & W_{a,c} & W_{a,d} \\ W_{b,a} & W_{b,b} & W_{b,c} & W_{b,d} \\ W_{c,a} & W_{c,b} & W_{c,c} & W_{c,d} \\ W_{d,a} & W_{d,b} & W_{d,c} & W_{d,d} \end{bmatrix} = \begin{bmatrix} 1 & 0.1 & 0.1 & 0 \\ 0 & 0.9 & 0.2 & 0 \\ 0 & 0 & 0.65 & 0 \\ 0 & 0 & 0.05 & 1 \end{bmatrix}$$

$$W_{L(3)(a)} \equiv \begin{bmatrix} W_{11} & W_{12} & W_{13} \\ W_{21} & W_{22} & W_{23} \\ W_{31} & W_{32} & W_{33} \end{bmatrix} = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

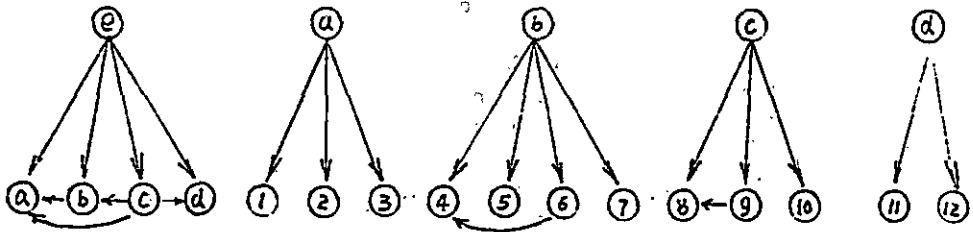
$$W_{L(3)(b)} \equiv \begin{bmatrix} W_{44} & W_{45} & W_{46} & W_{47} \\ W_{54} & W_{55} & W_{56} & W_{57} \\ W_{64} & W_{65} & W_{66} & W_{67} \\ W_{74} & W_{75} & W_{76} & W_{77} \end{bmatrix} = \begin{bmatrix} 1 & 0 & 0.2 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 0.8 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

$$W_{L(3)(c)} = \begin{bmatrix} W_{c3} & W_{c9} & W_{c10} \\ W_{93} & W_{99} & W_{910} \\ W_{103} & W_{109} & W_{1010} \end{bmatrix} = \begin{bmatrix} 1 & 0.2 & 0.1 \\ 0 & 0.8 & 0 \\ 0 & 0 & 0.9 \end{bmatrix}$$

$$W_{L(3)(d)} = \begin{bmatrix} W_{d11} & W_{d12} \\ W_{1211} & W_{1212} \end{bmatrix} = \begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$$

(III) Resolution of the System and Overall Priorities.

We see easily that it is a hierarchic system with innerdependence and that there is not relation of circular dominance among elements. The impact role of any elements come from its lower level and each element at the same level. By [2] this system (Figure 0) can resolve into five subsystem as follows,



(figure 1)

(figure 2)

(figure 3)

(figure 4)

(figure 5)

Where,

The systems denoted with Figure 2 and 5 are independence hierarchic system. The system denoted with Figure 1 (3 or 4) are equivalent with a independence hierarchic system that their weight values are $W_{L(2)} \times W_{L(2),e}$ ($W_{L(3)(c)} \times W_{L(3),c}$ or $W_{L(3)(b)} \times W_{L(3),b}$) under criteria e (borc), respectively.

The overall priorities for alternatives with respect to the criteria in each subsystem as follows,

$$W_{L(2)}^e = W_{L(2)} \times W_{L(2),e} = (0.24, 0.40, 0.25, 0.11)^T$$

$$W_{L(3)}^a = W_{L(3)(a)} \times W_{L(3),a} = (0.382, 0.334, 0.284)^T$$

$$W_{L(3)}^b = W_{L(3)(b)} \times W_{L(3),b} = (0.214, 0.323, 0.242, 0.221)^T$$

$$W_{L(3)}^c = W_{L(3)(c)} \times W_{L(3),c} = (0.367, 0.313, 0.320)^T$$

$$W_{L(3)}^d = W_{L(3)(d)} \times W_{L(3),d} = (0.6, 0.4)^T$$

