

QUANTITATIVE STUDY ON CLASSROOM TEACHING EVALUATION

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Abstract: This article quantitates classroom teaching evaluation by using the fuzzy theory, and we've achieved very good results in teaching administration by using this method.

Key Words: classroom teaching, fuzzy relation

1. Introduction

Classroom teaching, through which teaching effects, teaching levels and professional abilities can be manifested, is a central link in teaching activities. Therefore, both for the teachers and for the teaching administration, how to evaluate classroom teaching becomes a seriously studied problem. Classroom teaching is a complicated intelligent work, however, it covers not only the knowledge a certain subject needs, but also the advanced complicated art of various aspects of knowledge, such as, pedagogy, psychology, aesthetics, linguistics, logic, sociology, and behaviour science. Consequently, they are alternate and permeable with each other to some degree, and there are no clear dividing lines among them. These bring us difficulty in quantitating. This article quantitates classroom teaching evaluation by using the fuzzy theory, and the result tallies with the facts.

2. Mathematical model of classroom teaching quantitative evaluation

2.1 The main factor set.

There are many factors affecting the lecture, we think the main ones are as followings:

Clarity and easy understanding (u_1) : mainly refers to the clear train of thought, integrate concept, rigorous orderliness and arrangement, strict and logical reference, simple and direct expression.

Vividness and liveliness (u_2) : mainly refers to the vivid and heuristic speech, lively and serious classroom atmosphere.

Familiarity with teaching materials (u_3) : mainly refers to strict arrangement, and proceeding in an orderly way and step by step, and stressing the main points, decentralizing the difficult points in the materials organizing; converting from unknown to known naturally; drawing inferences about other cases from one instance.

Clear and tidy writing on the blackboard (u_4) : mainly refers to writing on the blackboard in a planned way and with clear and neat handwriting; convenience to take notes; drawing figures while writing on the blackboard.

These factors form the index system, i.e. ,the factor set

$$U = \{u_1, u_2, u_3, u_4\}$$

2.2 Remark set

According to general teaching results, we divide them into four grades: excellent, good, ordinary, poor. i.e.

$$V = \{\text{excellent}(v_1), \text{good}(v_2), \text{ordinary}(v_3), \text{poor}(v_4)\}$$

2.3 Single factor evaluation

We set up a fuzzy relationship from U to V, and it can be shown in matrix as follows:

$$\underline{R} = \begin{bmatrix} r_{11} & r_{12} & r_{13} & r_{14} \\ r_{21} & r_{22} & r_{23} & r_{24} \\ r_{31} & r_{32} & r_{33} & r_{34} \\ r_{41} & r_{42} & r_{43} & r_{44} \end{bmatrix}$$

Where $r_{ij}(i,j=1,2,3,4)$ indicates the possible degree of making the j -th remark on the evaluated teacher from the i -th factor. Fixed j , $(r_{i1}, r_{i2}, r_{i3}, r_{i4})$ is a fuzzy set on V , this indicates the evaluated teacher is made a single evaluation considering the i -th factor.

2.4 Determining the weight distribution

Each factor $u_i (i=1,2,3,4)$ in U has different effects on classroom teaching results. That is, there are different weights among the factors in U . Students' reflections on this matter can be shown with a fuzzy subset \underline{A} in U . The subordination degree $\mu_{\underline{A}}(u) (u \in U)$ of factor u to \underline{A} in U is called weight of factor u , and satisfies

$$\sum_{i=1}^n \mu_{\underline{A}}(u_i) = 1$$

2.5 Overall evaluation

With the matrix \underline{R} of single factor evaluation and the weight distribution \underline{A} , the overall evaluation can be calculated by the model:

$$\underline{B} = \underline{A} \circ \underline{R}$$

3. Applied examples

As far as a certain teacher's "clarity and easy understanding" is concerned, 38 percent of the students in the class think it "excellent" ; "good" , 50 percent; "ordinary" 12 percent. Then the evaluation for "clarity and easy understanding" is (0.38, 0.5, 0.12, 0) ; "vividness and liveliness" ,(0.1, 0.2, 0.6, 0.1); "familiarity with teaching materials" , (0.7, 0.2, 0.1, 0); "neat and clean writing on the blackboard" ,(0.2,0.2,0.4,0.2),
then

$$\underline{R} = \begin{bmatrix} 0.38, & 0.5, & 0.12, & 0 \\ 0.1, & 0.2, & 0.6, & 0.1 \\ 0.7, & 0.2, & 0.1, & 0 \\ 0.2, & 0.2, & 0.4, & 0.2 \end{bmatrix}$$

By the way of the experts' consultation, the four factors' weights in V are respectively 0.4,0.3, 0.2, 0.1 i.e.

$$\underline{A} = (0.4, 0.3, 0.2, 0.1).$$

Where \underline{A} indicates: the students weighing degree for "clarity and easy understanding" , "vividness and liveliness" , "familiarity with teaching materials" , and "neat and clean writing on the blackboard" are respectively 40 percent, 30 percent, 20 percent, 10 percent. Calculation:

$$\underline{B} = \underline{A} \cdot \underline{R} = (0.4, 0.3, 0.2, 0.1) \cdot \begin{bmatrix} 0.38, & 0.5, & 0.12, & 0 \\ 0.1, & 0.2, & 0.6, & 0.1 \\ 0.7, & 0.2, & 0.1, & 0 \\ 0.2, & 0.2, & 0.4, & 0.2 \end{bmatrix}$$

$$= (0.38, 0.4, 0.3, 0.1)$$

Grouping B to one: $D=(0.32, 0.34, 0.26, 0.08)$

This indicates that students' evaluation for the teacher is : "excellent", 32 percent; "good", 34 percent; "ordinary", 26 percent; "poor", 8 percent. According to the maximum subordinate principle, the overall evaluation for the teacher's teaching is "good".

4. Conclusion and problems

Through experiments and studies, we conclude that quantitating classroom teaching evaluation is not only necessary, but also utterly feasible. It can be carried out both in students and in teachers, and it can surely meet the quality demands by using mathematical model and computer. Objective and accurate classroom teaching evaluation helps the teaching administrative departments to be familiar with the teachers, provides them reliable references for a series teaching decisions, such as, how to arrange teaching tasks, how to adjust teachers structure, how to arrange courses, etc.

The evaluating indexes of classroom teaching results is a problem that is worth studying. We have raised four indexes above. Are they more or less? This question needs to be studied further.

References:

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