An Assessment Method

Of Mathematical Classroom Teaching for Senior High Schools

------Based on China's National New Mathematical Curriculum Reform

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Background

Since the new round of reform of the mathematics curriculum in China, people have begun to focus on the assessment of mathematical classroom teaching. Especially, the Mathematical curriculum reform for senior high school has already entered the critical stage indicated by the fact that 'The Curriculum Standard of Mathematics for Senior High School (Experiment)' was officially promulgated by Ministry of Education of the People's Republic of China in 2003. In particular, the updated educational conception having been introduced became an integral part of the new curriculum standard, in which the new conceptual framework, the content system, the teaching methods and the educational function have already been developed. Under such conditions, many mathematical researchers and educators have begun to explore how to effectively work on the assessment of mathematical classroom teaching.

Selection of the methods of the mathematical classroom teaching assessment for the senior high school

There are various kinds of the methods for evaluating mathematical classroom teaching for the senior high school, among which the most commonly used is that after a lecture is attended, an overall assessment is made, , pointing out the advantages and disadvantages, and making suggestions for improvement of the classroom teaching. Moreover, there are several principal assessment methods including the scale assessment, the appraisement based on internet, the court-like argument, the behavior follow-up, the multi-factor comprehensive assessment, and so on. (Shen Yushun, 2006). Here the discussion will focus only on the multi-factor comprehensive assessment method for classroom teaching (The Experiment Group of Qingpu Teaching Reform, 1992) which is redeveloped and applied in current Chinese senior high schools.

The Multi-Factor Comprehensive Assessment Method for classroom teaching

a. Attending a lecture and recording the classroom: offer dependable evidence of the appraisal of the lecture

b. The appraisal meeting: make a complete recollection and overall analysis of the lecture

c. Marking by the Judges:

● **Quantifying the degree of the Judges' Remarks**

To quantify the degree of the remarks pertaining to the lecture from score 0 to 10 based on the comparison of the judgment, and to score it by reference to the descriptive adverbs, the relationship between the description adverb and mark is as follows: absolutely affirmative ---10 scores; very affirmative ---8 scores to 10 scores; mostly affirmative ---a score of 6 to 7; neither affirmative nor negative---- a score of 5; mostly negative- ---a score of 3 to 4; very negative---1 score to 2 scores; absolutely negative ------0 score

● **Marking the Remarks**

The judges can give a score that is the most suitable and closest to the degree chosen from the above five groups. Following this, dual comparisons can be made between the neighboring groups to be marked. Likewise, the same procedures will be applied to all group judgment. So a certain group of scores can be explained on the basis of the descriptive adverbs

● **Normalizing the mark**

Normalize all the marks, for example (6，9，3，1，0) can be normalized as（.3158，.4737，.1579，.0526，.0000）. While there is more than one judge, each should first give the marks to the lecture in question, then normalize his own, and finally take the mean number from the normalized set. The marking table   follows:

the appraisal factors			weight	the appraisal groups				
				Excellent	Good	Fair	Poor	Bad
The behaviors of teacher (40 scores)	U1	The organizing capabilities	15					
	U2	The degree of focusing on the students' development	5					
	U3	The teaching attitude	5					
	U4	The teaching tact	5					
	U5	The teaching bourn	10					
The behaviors of students	U6	The participative condition	14					
	U7	The emotion condition	10					
	U8	The communicative condition	14					
	U9	The thinking condition	12					
	U10	The psychological condition	10					

After having been scored according to the five groups of remarks, ten appraisal factors of the lecture can be arrayed as the matrix R of single appraisal factor. Therefore, we can figure out the matrixes of the four lectures (La, Lb, Lc and Ld) respectively, among which we attempt to make a comparison.

d. Data operation

If marking the weight distribution of each factor as "A", then the comprehensive appraisal of a lecture noted as "B" is $B = A \bullet R$. To easily reflect the results of comprehensive appraisal, the class matrix $C = (1, .75, .50, .25, 0)$ can be used to figure out the value of comprehensive appraisal of a lecture as " W " $W = B \bullet C^T$ (C^T is the transpose matrix of C). Known from the aforesaid operation as follows, $W = (A \bullet R) \bullet C^T$, the Matrix multiplication can

satisfy the associative law, so $W = A \bullet (R \bullet C^T)$. Note $D = R \bullet C^T$ $D = \begin{bmatrix} d_1 \\ d_2 \\ \vdots \\ d_{10} \end{bmatrix}$.

Hereinto, $d_1, d_2, \ldots d_{10}$ denotes the value of appraisal of single factor.

Furthermore, known from the above-said, the comprehensive appraisal value of one lecture is actually the weighted mean of appraisal value of single factor.

e. The judgment and analysis

Advantages : A reasonable judgment and analysis can be made from the marks by judges and the data operation on the basis of the appraisal meeting based on a lecture.

Firstly, more than one lecture can be compared by the value of the comprehensive appraisal. For example, the lectures can be ordered by magnitude, that is $W(Lb) > W(La) > W(Lc) > W(Ld)$;

Secondly, by use of such a method, we can separately make the comparison between the comprehensive appraisal values and single factor of some lectures, which can help us to easily find out where the advantages and disadvantages of each lecture will be, to directionally accumulate the teaching experience and to improve the teaching practice. For instance, Lb is appraised as **"good"**, and especially good at "the organizing capabilities", but weak at "the emotion condition". "the thinking condition" of Lc is weak and leaves much to be desired. 'The organizing capability" of Ld is not well performed, but is well done for other factors.

Limitations: The method is applicable to the lectures among which there is much similar appraisal result for each factor, but not to those with several highly scored factors in the appraisal or those with many low scores in the important factors while other factors are classified as a group as "fair" (as above-mentioned Ld). That is because the weighted mean may balance these differences resulting in an unreasonable appraisal, but in another way, the above disadvantages can be made up by *the Ranking Judgment Appraisal Method*, which can later be introduced in detail in the working group.

f. Comments

The multi-factor comprehensive assessment method for classroom teaching is a mode of the quantified appraisal of a lecture. The confirmation of the appraisal factor and its weight therein attaches a great importance to its appraisal. Certainly, they will vary with the regions, the times, the characteristics and personalities of the teachers and the students, the types of subject and the teaching perspectives. Therefore, how to obtain a relatively consistent lecture appraisal requires the teachers' and the researchers' great efforts. And in the meantime, it is necessary for the judges to be professionally trained so as to render the judgment and evaluation more objective and accurate.

In addition, each appraisal factor can be further evaluated in the teaching research and practice from time to time. Here, any one of them can be divided into several sub-factors which may be weighted in the same manner as mentioned above, and the overall assessment can then be made. Such a multi-level comprehensive assessment method for classroom teaching may enhance the accuracy of a lecture appraisal.

Reference

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