The New method of undergraduates' academic achievement evaluation based on validity of management

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Abstract— **The evaluation of undergraduates' academic achievement is of great importance in college education appraisal. At present it stays in a traditional way. That is to evaluate student's academic performance only by the final score for a certain subject. Obviously, it has two weak points. One is that it's hard to show the level of a student's effort; the other is that it makes the student lack of enough initiative who performs poorly at the beginning but makes a rapid progress through a period of hard work, because his final scores still lag behind comparing with the students who have good basic conditions. It's demanding to set up a more scientific and reasonable method of evaluating academic achievements by developing the present one and making it perfect. Combining the theory of management validity with building a data model for measuring the effective effort of an individual student, students' effective level of effort can be got. It would be more fair to receive rewards for the students who work harder and can't get the best score but promote a lot, because it shows the principle of no pains no gains. In the meantime, a new way to appraise student's academic achievement has been providing which focuses on students' effort level.**

Keywords-management validity; academic; achievement evaluation

I. INTRODUCTION

Modern psychology shows college study is the most valuable stage in which a majority of the students could study the courses well for they have enough energy; have a good memory; have four years full-time study. However, the fact is on the contrary. Once the students are enrolled in the higher-learning institutions, the excellent study habit built in the former schools will lose gradually as well as the level of effort. Some research indicates lack of non-intelligence factors including better study motive, desire, self-confidence and self-efficiency results in the problems related to study, of which one reason is the present study stimulating system of higher-learning institutions behaves badly.

II. THE STATUS OF THE CURRENT ACADEMIC ACHIEVEMENT EVALUATION SYSTEM IN GENERAL

The significance of academic achievement evaluation system of higher-learning institutions lies in its enhancing teachers' teaching, learners' learning and promoting the level of guiding students' study together with teaching reform. Academic achievement evaluation is a process in which the merits of learning can be judged according to a certain standard. In recent years, academic achievement evaluation system of higher-learning institutions has been improved a lot, such as the importance of academic achievement evaluation system has been realized; honesty has been achieved in doing exams and more scientific method has been applied in the field related to exams. But scores are still the key factor to award scholarship as well as diploma and to decide which subject should be retaken. The above shows us the current academic achievement evaluation system keeps traditional. Its strengths are direct and easy to be researched by quality and quantity. Its weaknesses lie in the following two ways. The first is the result of evaluation tends to be affected by the basic conditions of individuals, so it's hard to reflect one's subjective level of effort in the process of learning. The second is it attracts learners to look for the objective reasons but to ignore their level of subjective effort. In this sense its stimulating function is very limited. As a result, learners' learning motive can't be fully active. How to set up a more scientific and more reasonable academic achievement evaluation system is an urging question. Although some scholars began paying attention to it in the previous studies, a better way to solve it has not been found out.

III. THE PROBLEMS OF THE CURRENT ACADEMIC ACHIEVEMENT EVALUATION SYSTEM IN DETAIL

With the rapid development of china's economy and the deep reform of higher-learning education system, the role of stimulating mechanism which acts as one of the ways to develop talents in higher-learning institutions becomes more and more important. American psychologist William James finds out that if one isn't encouraged, his potentiality only can be developed by 20%-30%; while one is stimulated correctly and fully, his ability can be exerted to 80%-90%. Because of the important function of stimulating mechanism it is applied widely in the work of students' affairs for higher-learning institutions. Through years of practice, the stimulating mechanism has formed where rewards and honors act as the main roles including various scholarships awardance, Sanhao students'(students who have good physical condition, good academic performance and good morality) appraisal and election as well as the appraisal and election of students' model, excellent students

cadre and excellent graduates etc. The current students' stimulating mechanism mainly obeys the reward rules which is issued by the students affairs department, while the adding details which is made by the sub-branch of students affairs department attached to the different colleges in a university should also be followed. On the whole, the system of appraising excellence based on comprehensive appraisal and election can check a student's comprehensive ability and stimulate a student's motive. But many problems still exist based on the scores of a student's comprehensive quality.

Martin Luther King, notes everything can be done with your strong desire. Man's feeling of value and goal originates from the environment awareness, which leads to needs that can stimulate motives. However, whether motives can stimulate actions depends on the probability of achieving anticipated goal which is caused by actions. A famous formula is provided by psychologist Erich Fromm based on the above theory: $M = V \times E$. M refers to the degree of engagement in a certain activity, called the level of stimulation. E refers to the probability of achieving anticipated goal which is caused by a certain action, which is called the degree of anticipation. V refers to man's degree of cherishment and appraisal for some goal. That is the degree of the goal evaluation, called the degree of effectiveness. That formula suggests one's degree of motive would be higher when one's needs are stimulated and one's goal can be achieved. So this stimulating mechanism can play a part for the top students and can't exert its full stimulating function.

Albert Bandura tells when one predicts the result of a certain activity is good and is capable to fulfill the task, he would make an attempt to perform the activity. The present stimulating mechanism pays more attention to the crosswise comparison among peers, which makes many learners frustrated in study that tries his best but can't be excellent. As a result, they feel their ability is limited and degrade their self-worth. Naturally, they are self-abased and think that they can't get the excellent academic achievement even if they work very hard. Under the circumstance of losing self-confidence in study, the feeling of inferiority dominates learners that would cause learners' passion lower, set-back, out-of-control, depending on God and retreatment in study because of difficulty.

The assessment of comprehensive quality includes many contents. In order to get the other scores unrelated to academic achievement, many students concentrate their energy on activities which has nothing to do with study, therefore it hinders learning. In this sense, the stimulating mechanism imposes little effect on study.

To sum up, a new index called the level of effective effort has been mentioned in this essay. It tries to research the stimulating mechanism of students' academic achievement evaluation in a new angel so as to encourage students' learning motive and creativity. In this way learners' potentiality can be developed as well as learners'

study motive can be stimulated and self-confidence can be built. Consequently, a new method of students affairs' work can be created in higher-learning institutions, which can improve learners' study quality.

IV. DATA MODEL BUILDING FOR THE METHOD OF MEASURING EFFECTIVE EFFORT'S DEGREE.

Performance appraisal has been widely used since 1980. Administrators have realized its advantages and their businesses have shared the profits from the method. But traditional way of performance appraisal can only show the overall abilities of the objects and neglects the degree of subjective effective effort. It is unreasonable that the result of evaluation which is affected by good or bad basic conditions is used as the evidence of stimulation and constraint. A point of penetration can be made for the creativity and development of performance management by using the theory of management validity. It refers to a behavioral characteristic of evaluation unit profits caused by operating management regardless of the effect of good or bad basic conditions[1] .This essay's purpose is to measure the degree of effective effort in the study process by combining the theory of management validity with traditional academic achievement evaluation and then assessing students' academic performance. Finally, setting up "scholarship of rapid improvement in study" to encourage all the students.

This essay evaluates the relative efficiency of learners' academic achievement by using data envelopment analysis (DEA).The base of DEA is the concept "relative efficiency assessment". DEA's essence firstly is to compare the relative efficiency in the same type of decision-making units by using mathematical programming model; and then analyze every decision-making unit comprehensively based on that; after that, determine the efficiency of every decision-making unit's DEA; finally, show its reason and degree of inefficiency so as to improve every decision-making unit[2][3] .

Suppose DMU_j （j=1，2，3…，n）, DMU_j's input is $X_j = (x_{1j}, x_{2j}, \cdots, x_{mj})^T$, its output is $Y_j = (y_{1j}, y_{2j}, \cdots, y_{lj})^T$, the DEA's model for DMU_j can be represented as:

$$\max Z$$

$$\begin{cases} \sum_{j=1}^{n} \lambda_j X_j \leq X_0 \\ \sum_{j=1}^{n} \lambda_j Y_j \geq ZY_0 \\ \sum_{j=1}^{n} \lambda_j = 1 \\ \forall \lambda_j \geq 0, j = 1,2,\cdots n \end{cases}$$

If the above optimal value of linear programming $Z^0 = 1$, $DMU_0 = (X_0, Y_0)$ has management validity; if $Z^0 > 1$, $DMU_0 = (X_0, Y_0)$ has no management validity. On average, if Z^0 is the above optimal value of linear programming and set $\overline{X_0} = X_0, \overline{Y_0} = Y_0$, $(\overline{X_0}, \overline{Y_0})$ is the surface projection of relative efficiency in DEA for decision-making unit (X_0, Y_0); then, $\eta = Y_j / \overline{Y_j} = 1/Z^0 \times 100\%$ is the relative management efficiency for decision-making unit.

Suppose n is the quantity of academic achievement evaluation for a certain grade, every student is a decision-making unit DMU_j ($j=1, 2, 3\ldots, n$), input index for GPA of professional courses' scores for that grade in the first semester is X_j ($j=1, 2, 3\ldots, n$), output index for GPA of professional courses' scores for that grade in the second semester is Y_j ($j=1, 2, 3\ldots, n$), calculation is finished by using DEA model, the evaluation index of effective effort degree for student j can be measured by relative management efficiency.

Calculation of effective effort degree for a certain grade can be made by management validity theory. During the calculation process, the basic score is GPA of professional courses' scores for that grade in the first semester; the current score is GPA of professional courses' scores for that grade in the second semester; based on the above two indexes we have finished the calculation of effective effort degree for that grade. Table 1 and Table 2 are the basic data and calculative results. The calculation result analysis of effective effort degree based on students' GAP of professional courses in two semesters appears below.

The students who get high marks in the first semester and keep or surpass the level in the second semester have higher effective effort degree, such as student 2 and 3. The students who get low marks in the first semester and greatly surpass the level in the second semester have higher effective effort degree, such as student 17, 27 and 24. Let's make a comparison between student 11 and 12. The GPA of

student 11 and 12 in the first semester is 83.60, but the GPA of student 11 is 74.46 and the GPA of student 12 is 83.59, so student 12 ranks 14 and student 11 ranks 29 in effective effort degree. The GPA of student 18 drops vastly in the second semester, so it ranks behind in effective effort degree. Student 23, 25, 28, 29 ranks behind in effective effort degree because the GPA of them in the first semester is lower and is even worse in the second semester.

Calculative result shows that it is rational to use effective effort degree as the important index of evaluation in students' academic achievement evaluation. For one hand it can eliminate the effect of academic performance caused by students' good or bad basic conditions. For the other hand, the improvement of students' academic achievement can be shown only because of their subjective efforts.

The comparison made between the GPA of a student in current semester and that in previous semester based on management validity theory and the way of solve. Students' effective efforts can be measured by calculating the dynamic changes of students' GPAs. From this way, students' academic achievement can be evaluated and all the students can be encouraged. Good motives of students in different levels for learning all the time can be maintained by using the new way of evaluating academic performances; students' GPA can be improved by using the new way of

TABLE I. BASIC DATA OF GPA IN TWO SEMESTERS FOR A CERTAIN CLASS

student	GPA (semester1)	GPA (semester2)
1	89.89	88.02
2	89.09	88.19
3	88.37	88.02
4	87.63	85.36
5	86.17	89.75
6	85.89	87.20
7	85.83	90.22
8	85.46	87.20
9	84.83	85.39
10	84.40	80.25
11	83.60	74.46
12	83.60	83.59
13	82.63	83.58
14	82.51	81.76
15	81.00	83.98
16	80.74	74.44
17	80.71	77.61
18	80.57	71.22
19	80.34	79.42
20	80.17	77.05
21	79.69	79.27
22	79.63	79.98
23	79.57	72.88
24	79.51	81.59
25	79.17	76.24
26	79.00	80.27
27	78.51	81.15
28	77.23	73.49
29	76.43	70.53
30	76.40	75.86

evaluating academic performances; study interests can be

developed and self-confidence can be built; in the meantime, effective reference can be provided for students' guiding and management.

TABLE II. THE CALCULATIVE RESULT OF EFFECTIVE EFFORT DEGREE FOR A CERTAIN CLASS

student	Rank (semester 1)	Rank (semester 2)	Index of effective effort	Rank in effective effort
1	1	5	97.26	5
2	2	3	97.46	3
3	3	4	97.28	4
4	4	9	94.38	15
5	5	2	99.39	2
6	6	6	96.63	8
7	7	1	100	1
8	8	7	96.96	7
9	9	8	95.47	11
10	10	19	90.06	21
11	11	34	84.15	29
12	12	12	94.47	14
13	13	13	95.27	12
14	14	14	93.29	17
15	15	11	97.13	6
16	16	35	86.3	26
17	17	26	90	22
18	18	43	82.69	30
19	19	21	92.4	19
20	20	28	89.79	23
21	21	22	92.78	18
22	22	20	93.66	16
23	23	41	85.39	27
24	24	15	95.65	10
25	25	30	89.65	24
26	26	18	94.54	13
27	27	16	96.01	9
28	28	37	87.98	25
29	29	45	85.07	28
30	30	33	91.53	20

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