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Research on reflection scale application to University English teachers' growth influence

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ABSTRACT

Reflection is an important method of self-improvement, Akbari et al. established a systematic reflection model in 2010 that composed reflection scale, and was firstly applied in foreign language teaching. Reflection scale designs teachers' behaviors six aspects, teachers reflect on self-teaching from different perspectives to propel to and promote teachers' professional level and promote teachers growth. Reflection scale specifies teachers' reflection contents and methods; it can form into powerful self-reflection consciousness on teachers. The paper carries on researches and analysis on reflection scale application and English teachers growth relationship by fuzzy mathematical methods, and makes objective evaluations on application of reflection scale to universities English teachers growth influences.

KEYWORDS

INTRODUCTION

In the beginning of 21st century, state ministry of education launched university English teaching reformation; English teaching research has developed from previous teaching methods and students researches into foreign language teachers' occupational professional technological growth. Reflection is the strength of a worker's advancement, lots of scholars thought that English teachers' reflective ability had impacts on English teaching reformation orientation.

A great deal of scholars have researched on reflective teaching, from which Li Ban-Ban,Xu Jin-Fen added classroom specification composed seven-dimensional reflection scale on the basis of six-dimensional reflection scale, and thought localization of foreign researches was quite necessary[1]. Wang Qin-Mei, Chen Ying thought by researching on English teaching reformation that reflective teaching was core content of foreign language teaching reformation, and made research and analysis of English teachers' current reflective abilities[2]. Xu Jin-Fen, Li Ban-Ban in the article of Chinese universities English teaching reflection status investigation and study, made comparative analysis of different types of English teachers' reflective abilities, and got general English teachers' reflective levels were normal, there were gaps between men and women English teachers' reflection, English teachers with doctorate had highest reflective level, different titles affected teachers' reflective levels[7].

Though articles that study reflection scale are quite a lot, they lack of quantitative study on reflection scale application. The paper researches on reflection scale to English teachers' growth influences by fuzzy mathematical perspective. By mathematics quantified reflection scale to English teachers' influences, and find out reflection scale effects on English teachers' growth.

REFLECTION SCALE AND TEACHERS GROWTH

In reflection model, it covers multiple factors, design contents are more. Akbari et al constructed reflection model contents are comprehensive; it fully reflected reflective teaching and connotation of self-improvement by reflection. Its constructed reflection scale TABLE 1 is as following.

TABLE 1 : Reflection model dimension table

Factor	Definition	Example
Practice	Practice reflection by the way of practical action	Summarize reflection by working log
Cognition	Initiative advancement of developing individual technology through learning	Reading relative teaching books
Emotion	Communication and understand extent of students' emotion	Chat and exchange with students
Meta-cognition	Understand and cognize self-character and occupation	Individual experiences influences on teachers' occupation
Criticism	Reflection on social politics and current affairs in teaching	Discuss unfair examples in society
Morality	Occupational values, individual accomplishment and other aspects reflection	Care students and love jobs

Teachers' growth mainly reflects by self-education levels and work ethics. A teacher how to grow and make progress by reflection is a main effect of reflection scale. To research on reflection scale influences, it should study and define English teachers' growth and advancement indicators.

In indicator system, firstly it should have English teachers ability promotion in which aspects that advancement in training teaching ability. Secondly, whether teachers make progress or not is directly related to their students' learning status, learners' performance is an important reference indicator. Others have changes of teachers' behaviors; it can refer to teachers' behaviors changes in teaching and getting together with students, by reflecting, they carry on self-adjustment so as to arrive at

good teaching purpose. In addition, whether teachers' occupational belief and idea has improvements or not. On this basis, it establishes teachers' improvement indicators as following TABLE 2.

TABLE 2 : Teachers' growth indicators

Teachers growth indicator	Contents examples
Training teaching ability	Status of reasonable adjust time and adapt to students
Students' learning status	Students' classroom learning atmosphere and performance
Teachers behaviors	Teaching way, communication with students, self-reflection
Occupational belief and idea	Love education,care students, occupational dedication

By above reflection scale TABLE 2's factors and English teachers' growth indicators, it constructs reflection scale table to teachers' growth influential hierarchical structural table, and by indicator layers and reflection factors influential layers to English teachers growth, applies mathematical analytic hierarchy process and fuzzy mathematics to make research and analysis, as following TABLE 3.

TABLE 3 : Reflection scale to English teachers' growth influential hierarchical table

Reflection factors influential layer	English teachers' indicators' indicator layer	English teachers' target layer	Illustration
Practice	Training teaching ability		
Cognition	Students' learning status		All reflection factors have influences on English teachers' growth Indicators to certain extent, only extent has preferential weighting, so it should comprehensive consider.
Emotion		English teachers' growth influence research	
Meta-cognition	Teachers behaviors		
Criticism	Occupational belief and idea		
Morality			

FUZZY MATHEMATICAL COMPREHENSIVE EVALUATION MODELS

Fuzzy mathematics

Concept of fuzzy mathematics was firstly proposed by American mathematician professor L.A.Zadeh, in the beginning, it was put forward for computer mathematics, through development, fuzzy mathematics have applied in each field. It can research application of reflection scale to English teachers' growth influence by fuzzy mathematics. Steps are as following:

1 Establish evaluation objects factor domain of discourse U, that are primary factors that should adhere when evaluating things, in the paper,it refers to factors in reflection model.

$$U = (u_1, u_2 \cdots, u_n)$$

2 Define domain of discourse factors' qualitative remarks grade V,set remarks grades on evaluation things, reflection scale application to English teachers growth influence remarks can be set as : Influence extent is very high, relative high, high, relative low, low.

$$V = (v_1, v_2, \cdots, v_n) = (\text{very high, relative high, high ,relative low, low})$$

3 By factor corresponding remark domain of discourse membership r_{ij},establish fuzzy relation matrix R. Among them:

$$r_{ij} = \frac{\text{Number of people that evaluate one factor one grade in total number of experts}}{\text{Total number of experts}}$$

Let indicators membership under three criterions to compose three membership functions matrix, matrix form :

$$R = \begin{pmatrix} r_{11} & \cdots & r_{1m} \\ \vdots & \ddots & \vdots \\ r_{n1} & & r_{nm} \end{pmatrix}$$

Among them, r_{ij} represents indicators to remarks grade domain of discourse membership.

Establish fuzzy matrix

After making experts scores on indicators, sort and get six fuzzy matrixes are respectively as following:

(Practice)	Very high	Relative high	High	Relative low	Low
P_1	0.38	0.21	0.19	0.14	0.08
P_2	0.45	0.17	0.2	0.12	0.06
P_3	0.4	0.18	0.13	0.28	0.01
P_4	0.28	0.24	0.25	0.17	0.06

(Cognition)	Very high	Relative high	High	Relative low	Low
P_1	0.30	0.33	0.14	0.22	0.01
P_2	0.49	0.19	0.3	0.02	0
P_3	0.28	0.24	0.25	0.17	0.06
P_4	0.39	0.19	0.18	0.23	0.02

(Emotion)	Very high	Relative high	High	Relative low	Low
P_1	0.26	0.32	0.15	0.19	0.08
P_2	0.18	0.48	0.13	0.17	0.04
P_3	0.29	0.16	0.22	0.21	0.12
P_4	0.50	0.21	0.16	0.11	0.02

(Meta-cognition)	Very high	Relative high	High	Relative low	Low
P_1	0.27	0.31	0.17	0.19	0.08
P_2	0.25	0.20	0.19	0.18	0
P_3	0.29	0.16	0.22	0.21	0.12
P_4	0.48	0.18	0.13	0.17	0.04

(Criticism)	Very high	Relative high	High	Relative low	Low
P_1	0.14	0.20	0.22	0.17	0.26
P_2	0.21	0.20	0.11	0.27	0.21
P_3	0.30	0.18	0.20	0.19	0.13
P_4	0.18	0.23	0.34	0.25	0
Morality)	Very high	Relative high	High	Relative low	Low
P_1	0.33	0.28	0.13	0.17	0.09
P_2	0.11	0.13	0.19	0.39	0.18
P_3	0.33	0.15	0.26	0.13	0.13
P_4	0.54	0.23	0.14	0.09	0

Indicator weight calculation

Weight vector A, $A = (a_1, a_2, \cdots a_n)$, from which a_i represents English teachers growth indicators importance distribution. Weight can be obtained by hierarchical mathematical analysis method calculation. Firstly use 1-9 numbers to construct judgment matrix, constructed judgment matrix is as following :

	P_1	P_2	P_3	P_4
P_1	1	2	1	3
P_2	1/2	1	1/2	2
P_3	1	2	1	2
P_4	1/3	1/2	1/2	1

Consistency test and weight vector

Judgment matrix consistency indicator CI, and judgment matrix consistency rate CR, their computational method is as following formula shows:

$$CI = \frac{\lambda_{max} - n}{n - 1}$$

Among them, n represents judgment matrix order number that is also the number of comparison factors.

$$CR = \frac{CI}{RI}$$

When $CR \geq 0.1$, matrix inconsistency cannot accept, judgment matrix data needs to be adjusted. When $CR < 0.1$, judgment matrix can be thought to be consistency matrix.

TABLE 4 : Consistency test and weights result table

	P_1	P_2	P_3	P_4
w	0.356	0.194	0.325	0.125
λ		4.046		
CI		0.015		

CR	0.017

As TABLE 4 result, most important indicator in teachers growth is English teachers' training teaching ability, secondly is English teachers' behaviors, students performances and occupational belief. In case of reflection, teachers firstly will make progress in teaching training ability and behaviors aspects, after that application of reflection scale lets teachers level to be promoted and propels to students performances to be improved as well as English teachers' occupational belief promotion.

Calculation result

By above method calculation, it can get vector A ,fuzzy matrix. Compose A and R by utilizing composite operator $M(\bullet,\oplus)$,it gets vector $B=(b_1,b_2,\cdots b_m)$.

$$B=AOR=(a_1 \quad a_2 \quad a_3 \quad a_4)O\begin{pmatrix} r_{11} & r_{12} & \cdots & r_{15} \\ r_{21} & r_{22} & \cdots & r_{25} \\ \vdots & \vdots & \vdots & \ddots & \vdots \\ r_{41} & r_{42} & \cdots & r_{45} \end{pmatrix}$$

Among them, fuzzy matrixes are totally six, and

$$d_j=(d_1\underset{*}{\bullet}r_{1j})+(d_2\underset{*}{\bullet}r_{2j})+\cdots+(d_n\underset{*}{\bullet}r_{nj}),(j=1,2,\cdots m)$$

By calculating, it gets regarding reflection practice factor fuzzy evaluation vector

$B_1=(0.39 \ 0.20 \ 0.18 \ 0.19 \ 0.05 \ )$

Similarly calculate and can get other factors fuzzy evaluation vectors are respectively as following

$B_2=(0.34 \ 0.26 \ 0.21 \ 0.17 \ 0.03 \ )$

$B_3=(0.28 \ 0.29 \ 0.17 \ 0.18 \ 0.08 \ )$

$B_4=(0.30 \ 0.22 \ 0.19 \ 0.19 \ 0.07 \ )$

$B_5=(0.2106 \ 0.1973 \ 0.2072 \ 0.2059 \ 0.1756 \ )$

$B_6=(0.31 \ 0.20 \ 0.19 \ 0.19 \ 0.11 \ )$

According to maximum membership principle, practice, cognition, meta-cognition, criticism, morality evaluation on English teachers growth are very high, practice evaluation on English teachers' growth is very high, emotion evaluation on English teachers growth is relative high.

Set in reflection scale, factor weight is : $\alpha=(0.2 \quad 0.2 \quad 0.15 \quad 0.15 \quad 0.15 \quad 0.15)$

Factor weight vector matrix and fuzzy evaluation obtained evaluation vector matrix carry on calculation; calculate reflection scale to English teachers' growth influence. Result is as following:

$B = (0.31 \quad 0.23 \quad 0.19 \quad 0.19 \quad 0.08 \quad)$

So application of reflection scale to universities English teachers growth influence should be evaluated as very high. And numbers of people that approve occupy 31% of total number of people. According to fuzzy mathematical maximum membership principle, judgment result is very high. In reflection scale, practice, cognition, meta-cognition, criticism and morality have larger influences on English teachers' growth. Emotion influences on English teachers' growth are relative small. For teachers growth, according to reflection scale established hierarchical structure calculation, it shows in reflection scale, firstly affect training teaching and English teachers behaviors, subsequently it goes into comprehensive influence stage, and propels to English teachers all-round growth. Reflection scale has important effects on English teachers' growth.

CONCLUSION

By fuzzy mathematics research, it finds that reflection scale's application influential effects on universities English teachers' growth are very high, reflection scale's application can promote and propel to universities English teachers professional technology and occupational ethics. In reflection scale six reflection dimensions, practice and cognition have larger effects on English teachers' growth, English teachers constantly promote themselves by repeated process of practice and cognition. In teachers' growth, application of reflection scale mainly affects English teachers' growth by promoting English teachers training teaching and teachers' behaviors. Two preferential weighting influence extents get closer to 70%. To sum up, application of reflection scale has obvious effects on universities English teachers' growth, it suggests to fully excavate and apply reflection scale in universities English teaching reformation, and go deeper into each link of English teaching.

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