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Environment adaptive model-based to university english standard linguistic competence evaluation analysis

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ABSTRACT

With the development of integration of world economy, English as a main communicative language, it has already become Chinese second learning language, however due to Chinese education system and English education have differences, it leads to China's cultivation on university students' English competence lacking of practicability. In order to find out solutions and University English standard linguistic competence evaluation system in new environment, the paper according to analytic hierarchy process, in case considering practicability, professional needs, the need for exchange and improve self-cultivation as well as other influence factors, it gets China universities English standard linguistic competence evaluation main evaluation criterion proportions, that oral English ability, English reading ability and English understanding and application ability proportions are respectively 0.353,0.314 and 0.333. Thereupon, after English education environment changing, adapt to its characteristics, it gets University English standard linguistic competence evaluation indicators are oral English ability, reading ability as well as understanding and application ability. Therefore, when evaluating university English standard linguistic competence, it should focus on the three indicators to establish evaluation system.

KEYWORDS

Environmental adaptation; Linguistic competence evaluation; Analytic hierarchy process; University English; Mathematical model.

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INTRODUCTION

After opening-up and reform, with constantly promotion of Chinese comprehensive strength, China has already developed towards internationalization in all aspects. Therefore, civil English level is also rapidly promoting. However, learning English still has lots of inadaptation and difficulties for Chinese public that has already adapted to traditional education. By constant reformation, Chinese education level is also rapidly promoting, however due to Chinese education form to English education efficiency is poor, it leads to most of university students' English becoming "dumb English" in study, therefore it is difficult to cultivate University students English into practical English. For these difficulties, Chinese education circles are also constantly reforming English education; it includes providing lots of material environment, social cultural environment and spiritual environment, all of these works together to promote Chinese universities students English level. With education environment changing, previous evaluation ways on University English standard linguistic competence naturally should also have some changes; the paper will make analysis and research on university English standard linguistic competence evaluation ways.

MODEL ESTABLISHMENT

Construct hierarchical structure

In order to find out China nowadays main evaluation criterions on university English standard linguistic competence evaluation, firstly it should find out most influential aspects to linguistic competence that is finding out main influence factors that affect English standard linguistic competence evaluation. Subsequently, the paper bases on analytic hierarchy process, it makes quantization on university English standard linguistic competence evaluation main evaluation criterions. And then, it establishes target layer, criterion layer and scheme layer relations.

Target layer: University English standard linguistic competence evaluation.

Criterion layer:scheme influence factors, Y_1 is practicability、Y_2 is professional needs 、Y_3 it then need for exchange、Y_4 is improve self-cultivation.

Scheme layer:V_1 is oral English ability 、V_2 is reading ability, V_3 is understanding and application ability, it gets hierarchical structure as Figure 1 shows.
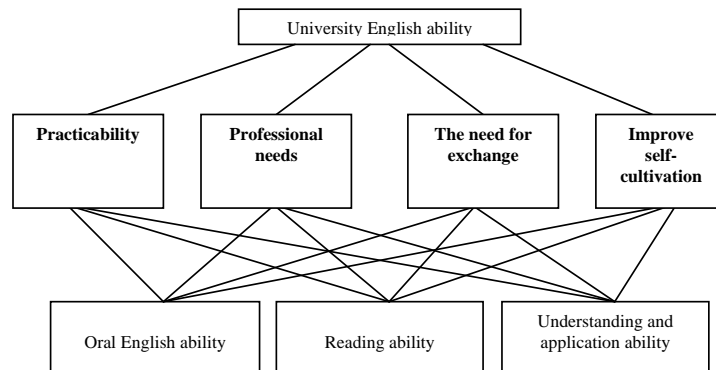

Figure 1 : Hierarchical structure

Construct judgment matrix

In order to get each factor comparison quantified judgment matrix, here set 1~9 scale, as TABLE 1 shows.

TABLE 1 : 1-9 Scale table

Scale a_{ij}	Definition
1	factor i and factor j have equal importance
3	factor i is slightly more important than factor j
5	factor i is relative more important than factor j
7	factor i is extremely more important than factor j
9	factor i is absolute more important than factor j
2,4,6,8	Indicates middle state corresponding scale value of above judgments
Reciprocal	If i factor compares to j factor, it gets judgment values is, $a_{ji} =1/ a_{ij}, a_{ii} =1$

Now set a_{ij} to represent ratio of β_i and β_j to G influence, and get judgment matrix A ,in the paper set judgment matrix between layer two and layer one is A_1 ,element a_{ij} ,divisor α_i, α_j , factor is A_1 , then it has following formula showed judgment matrix A_1

$$A_1 = \begin{bmatrix} A_1 & \alpha_1 & \alpha_2 & \alpha_3 & \alpha_4 \\ \alpha_1 & a_{11} & a_{12} & a_{13} & a_{14} \\ \alpha_2 & a_{21} & a_{22} & a_{23} & a_{24} \\ \alpha_3 & a_{31} & a_{32} & a_{33} & a_{34} \\ \alpha_4 & a_{41} & a_{42} & a_{43} & a_{44} \end{bmatrix}$$

And in above formula, for a_{ij} values defining, we generally adopt 1~9 proportion scale to assign value on influence extent, as Figure 2 shows.
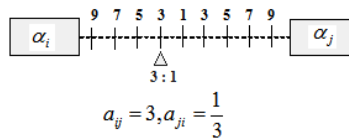

$$a_{ij} = 3, a_{ji} = \frac{1}{3}$$

Figure 2 : Nine scale assignment schematic diagram

According to lots of experts experiences and refer to lots of documents as well as 1~9 scale setting, it gets paired comparison matrix that are respective as TABLE 2-6.

TABLE 2 : Comparison matrix G

G	Y_1	Y_2	Y_3	Y_4
Y_1	1	1/3	6	6
Y_2	3	1	2	2
Y_3	1/6	1/2	1	1
Y_4	1/6	1/2	1	1

TABLE 3 : Comparison matrix Y_1

Y_1	V_1	V_2	V_3
V_1	1	1	1/5
V_2	1	1	1/5
V_3	5	5	1

TABLE 4 : Comparison matrix Y_2

Y_2	V_1	V_2	V_3
V_1	1	5	7
V_2	1/5	1	3
V_3	1/7	1/3	1

TABLE 5 : Comparison matrix Y_3

Y_3	V_1	V_2	V_3
V_1	1	6	3
V_2	1/6	1	5
V_3	1/3	1/5	1

TABLE 6 : Comparison matrix Y_4

Y_4	V_1	V_2	V_3
V_1	1	6	5
V_2	1/6	1	4
V_3	1/5	1/4	1

Consistency test

Use consistency indicator test formula as: $CI = \dfrac{\lambda_{max} - n}{n-1}$. Among them, λ_{max} is comparison matrix maximum feature value; n is comparison matrix order. It is clear that judgment matrix is inversely proportional to CI value.

$$C = \begin{Bmatrix} 1 & 1/3 & 6 & 6 \\ 3 & 1 & 2 & 2 \\ 1/6 & 1/2 & 1 & 1 \\ 1/6 & 1/2 & 1 & 1 \end{Bmatrix}$$

$$\xrightarrow{\text{line vector normalization}} \begin{Bmatrix} 0.231 & 0.142 & 0.6 & 0.6 \\ 0.693 & 0.429 & 0.2 & 0.2 \\ 0.038 & 0.215 & 0.1 & 0.1 \\ 0.038 & 0.215 & 0.1 & 0.1 \end{Bmatrix}$$

$$\xrightarrow{\text{Solve sum by line}} \begin{Bmatrix} 1.573 \\ 1.522 \\ 0.453 \\ 0.453 \end{Bmatrix}$$

$$\xrightarrow{\text{Normalization}} \begin{Bmatrix} 0.393 \\ 0.381 \\ 0.113 \\ 0.113 \end{Bmatrix} = W^{(0)}$$

$$CW^{(0)} = \begin{Bmatrix} 1 & 1/3 & 6 & 6 \\ 4 & 1 & 2 & 2 \\ 1/6 & 1/2 & 1 & 1 \\ 1/6 & 1/2 & 1 & 1 \end{Bmatrix} \begin{Bmatrix} 0.393 \\ 0.381 \\ 0.113 \\ 0.113 \end{Bmatrix} = \begin{Bmatrix} 3.941 \\ 3.825 \\ 1.145 \\ 1.145 \end{Bmatrix}$$

$$\lambda_{max}^{(0)} = \frac{1}{4}\left(\frac{3.941}{0.393} + \frac{3.825}{0.381} + \frac{1.145}{0.113} + \frac{1.145}{0.113} \right) = 4.10$$

$$w^{(0)} = \begin{pmatrix} 0.393 \\ 0.381 \\ 0.113 \\ 0.113 \end{pmatrix}$$

Judgment matrix is:

$$C_1 = \begin{Bmatrix} 1 & 1 & 1/5 \\ 1 & 1 & 1/5 \\ 5 & 5 & 1 \end{Bmatrix}, C_2 = \begin{Bmatrix} 1 & 5 & 7 \\ 1/5 & 1 & 3 \\ 1/7 & 1/3 & 1 \end{Bmatrix}, C_3 = \begin{Bmatrix} 1 & 6 & 3 \\ 1/6 & 1 & 5 \\ 1/3 & 1/5 & 1 \end{Bmatrix}, C_4 = \begin{Bmatrix} 1 & 6 & 5 \\ 1/6 & 1 & 4 \\ 1/5 & 1/4 & 1 \end{Bmatrix}$$

Corresponding maximum feature value and feature vector in successive are:

$$\lambda^{(1)}{}_{max} = 4.32, w^{(1)}{}_1 = \begin{Bmatrix} 0.314 \\ 0.223 \\ 0.420 \end{Bmatrix}$$

$$\lambda^{(2)}{}_{max} = 4.62, w^{(1)}{}_2 = \begin{Bmatrix} 0.625 \\ 0.259 \\ 0.088 \end{Bmatrix}$$

$$\lambda^{(3)}{}_{max} = 3.25, w^{(1)}{}_3 = \begin{Bmatrix} 0.650 \\ 0.230 \\ 0.113 \end{Bmatrix} \quad \lambda^{(4)}{}_{max} = 3.41, w^{(1)}{}_4 = \begin{Bmatrix} 0.614 \\ 0.264 \\ 0.185 \end{Bmatrix}$$

According to $CI = \dfrac{\lambda_{max} - n}{n-1}$ it gets RI value that can refer to TABLE 7.

TABLE 7 : RI value

n	1	2	3	4	5	6	7	8	9	10	11
RI	0	0	0.58	0.90	1.12	1.24	1.32	1.41	1.45	1.49	1.51

For judgment matrix C, $\lambda^{(0)}{}_{max} = 4.62, RI = 1.04$

$$RI = \frac{4.62 - 4}{4 - 1} = 0.021$$

$$CR = \frac{CI}{RI} = \frac{0.021}{1.04} = 0.02 < 0.1$$

It shows C inconsistency degree within permissible range, at this time it can use C feature vector to replace weight vector. Similarly, to judgment matrix C_1, C_2, C_3, C_4, all passed consistency test by using above principle. Therefore, calculation results from object layer to scheme layer can refer to Figure 3.

$$\begin{Bmatrix} 0.314 \\ 0.223 \\ 0.420 \end{Bmatrix}, \begin{Bmatrix} 0.625 \\ 0.259 \\ 0.088 \end{Bmatrix}, \begin{Bmatrix} 0.650 \\ 0.230 \\ 0.113 \end{Bmatrix}, \begin{Bmatrix} 0.614 \\ 0.264 \\ 0.185 \end{Bmatrix}$$

Calculation structure is as following:

$$w^{(1)} = (w_1^{(1)}, w_2^{(1)}, w_3^{(1)}, w_3^{(1)})$$
$$= \begin{Bmatrix} 0.314 & 0.625 & 0.650 & 0.614 \\ 0.223 & 0.259 & 0.230 & 0.264 \\ 0.420 & 0.088 & 0.113 & 0.185 \end{Bmatrix}$$
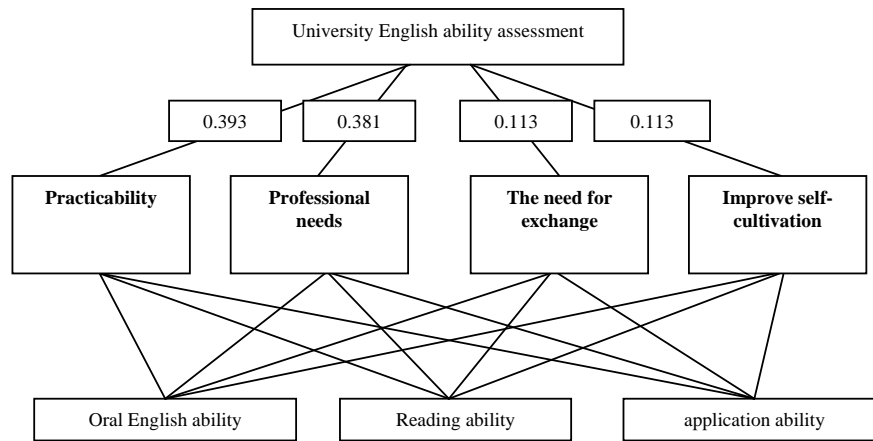
Figure 3 : Target layer to scheme layer calculation result

$$w = w^{(1)}w^{(0)}$$

$$= \begin{Bmatrix} 0.314 & 0.625 & 0.650 & 0.614 \\ 0.223 & 0.259 & 0.230 & 0.264 \\ 0.420 & 0.088 & 0.113 & 0.185 \end{Bmatrix} \begin{Bmatrix} 0.393 \\ 0.381 \\ 0.113 \\ 0.113 \end{Bmatrix}$$

$$= \begin{Bmatrix} 0.353 \\ 0.314 \\ 0.333 \end{Bmatrix}$$

By above analysis, it is clear that in evaluating university English standard linguistic competence process, in case considering practicability, professional needs, the need for exchange and improve self-cultivation as well as other influence factors, it gets China universities English standard linguistic competence evaluation main evaluation criterion proportions, that oral English ability, English reading ability and English understanding and application ability proportions are respectively 0.353、0.314 and 0.333. Thereupon, after English education environment changing, adapt to its characteristics, it gets University English standard linguistic competence evaluation indicators are oral English ability, reading ability as well as understanding and application ability. Therefore, when evaluating university English standard linguistic competence, it should focus on the three indicators to establish evaluation system.

CONCLUSION

The paper firstly makes simple analysis of Chinese English education forms and drawbacks, and notices reformation current English education system importance. Subsequently in order to establish university English standard linguistic competence evaluation system in new environment, the paper according to analytic hierarchy process, in case considering practicability, professional needs, the need for exchange and improve self-cultivation as well as other influence factors, it gets China universities English standard linguistic competence evaluation main evaluation criterion proportions, that oral English ability, English reading ability and English understanding and application ability proportions are respectively 0.353、0.314 and 0.333. Thereupon, after English education environment changing, adapt to its characteristics, it gets University English standard linguistic competence evaluation indicators are oral English ability, reading ability as well as understanding and application ability. Therefore, when evaluating university English standard linguistic competence, it should focus on the three indicators to establish evaluation system.

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