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Article

# Exploring the Reform of Course Evaluation System for English Majors in Colleges and Universities in the Internet Era

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**Abstract:** Under the situation that China's higher education has entered the connotative development centered on the quality of talent cultivation, it is of great significance to construct a scientific and reasonable evaluation index system for courses. Under the guidance of the theory of CIPP evaluation model and the principle of indicator construction, this paper proposes the evaluation system of English major courses in colleges and universities, and revises the indicator system according to the experts' opinions. The comprehensive weight value of each index in the evaluation system is obtained by combining the results of the topological hierarchical analysis method and the DEMATEL method, and then the cloud evaluation model is used to realize the intelligent evaluation and analysis of English major courses in colleges and universities. The results show that C31 “rich teaching methods” is the most important factor affecting the evaluation of English courses in colleges and universities, and the comprehensive weight value is 0.089. After the empirical application, it is found that this intelligent evaluation system can effectively evaluate the construction level of English courses in colleges and universities, and realize the optimization reform and application of the evaluation system of English courses in colleges and universities. It realizes the optimization reform and application of the evaluation system of English courses in colleges and universities. It is expected that this evaluation index system can be widely used in the field of evaluation of English professional courses in colleges and universities, effectively improve the quality of English professional courses in colleges and universities, and help the high-quality construction and development of English professional courses in colleges and universities.

**Keywords:** Topological Hierarchy Analysis; DEMATEL Method; Cloud Model; Evaluation System; English Major Course

## 1. Introduction

Under the background of the new curriculum reform, the teaching of English courses has new goals, and the comprehensive quality cultivation of students has been emphasized. Therefore, teachers need to strengthen their professionalism, optimize their teaching methods, and give play to students' enthusiasm through effective evaluation in classroom teaching [1-3]. Curriculum evaluation can also evaluate teachers' teaching activities, so that teachers can continuously improve their teaching methods, enhance students' learning interest and initiative, and better achieve the teaching goals [4-6].

Course evaluation is a very important part of teaching activities, and is also an important guarantee to improve the quality of teaching. Generally speaking, the course evaluation system is to integrate the relevant information in teaching together, to collect intelligence information from all parts of teaching activities, based on the basic requirements of the syllabus, and to take a multi-optimized evaluation to assess the realization of the overall objectives and sub-objectives of teaching [7]. The course evaluation includes the evaluation of teaching objectives, teaching content, teaching methods, teaching resources

and teaching environment. Among them, the evaluation of teaching objectives can be quantitatively assessed from the aspects of students' learning performance and ability enhancement; the evaluation of teaching content can be comprehensively evaluated from the aspects of knowledge structure, knowledge application and knowledge expansion; the evaluation of teaching methods can be assessed from the aspects of teacher-student interaction, students' participation and teaching organization; and the evaluation of teaching resources can be evaluated from the aspects of textbook selection, teaching equipment, teaching materials and so on; Teaching environment evaluation can be assessed from the aspects of classroom layout, teaching atmosphere, student behavior and so on [8-11]. Curriculum evaluation is very valuable, in the implementation of the curriculum evaluation system can promote the development of students' learning objectives, so that students learn to target learning, assessment to help improve the overall quality of students, evaluation throughout the teaching activities, teachers as the main body of the evaluation, and its evaluation affects the future development of students [12-15].

In the context of the Internet era, people's daily life and learning styles have also changed a lot. The challenge of classroom evaluation in English teaching in colleges and universities is also becoming more and more serious, and the traditional course evaluation system has many problems, such as single evaluation standard, obsolete evaluation methods, and lack of objectivity in evaluation results, which have seriously affected the quality of English teaching [16-19]. In the face of this challenge, colleges and universities should actively explore a new evaluation system to promote the reform of the evaluation system of college English major courses in English teaching.

Based on the basic principles of evaluation index construction, this paper formulates the evaluation system of English major courses in colleges and universities based on the theory of CIPP evaluation model and relevant research data. Then, through the Delphi method, we analyze the professional survey of English majors in colleges and universities, screen and propose the indicators in the evaluation system, and formulate the final indicator system for the evaluation of English majors' courses in colleges and universities. The indexes in the evaluation system are assigned with the Topical Hierarchy Analysis and DEMATEL methods, and the weights of the indexes in the evaluation system of English courses in colleges and universities are calculated by synthesizing the results of the assignments of the two methods. Immediately, the assignment results are inputted into the cloud evaluation model to evaluate the English major courses in colleges and universities. Finally, we take college H as a case object to explore the application effect of the evaluation system, and get the evaluation results of English major courses in college H according to the numerical eigenvalue and affiliation degree of the evaluation cloud of each index.

## 2. Method

### *2.1. Evaluation System Construction of English Majors' Courses in Colleges and Universities*

#### 2.1.1. Initial formulation of the indicator system

On the premise of adhering to the principles of evaluation system construction such as science and operability, and on the basis of the theoretical analysis of the CIPP evaluation model [20], this study takes its four evaluations as the first-level indicators of the evaluation system of English major courses in colleges and universities. Through studying the materials related to English major courses in colleges and universities, combined with meticulous interviews with frontline teachers of English major courses in colleges and universities, the names of different dimensions of the first-level indicators are adjusted according to the actual teaching of the courses, and 10 second-level subordinate indicators and 24 third-level subordinate indicators are selected for the preliminary construction of the indicators of the evaluation system of English major courses in colleges and universities. The preliminary evaluation index system is shown in Table 1. The first-level indicators in the evaluation index system of English courses in colleges and universities include the foundation of course construction (background evaluation), the configuration of course structure (input evaluation), the process of course implementation (process evaluation) and the effect of course acquisition (result evaluation).

***Table 1.*** Preliminary evaluation index system

| Primary indicator | Secondary indicator | Tertiary index | Index number |
|---|---|---|---|
| Foundation of curriculum construction (A) | Curriculum awareness (A1) | Curriculum education is clear | A11 |
| | | Clear course positioning | A12 |
| | Culture target (A2) | Course docking | A21 |
| | | Target setting commensurate height | A22 |
| Class configuration (B) | Teacher status (B1) | Teacher quality | B11 |
| | | Teacher size | B12 |
| | | Teacher structure | B13 |
| | Course setting (B2) | Standard of teaching materials | B21 |
| | | Appropriateness | B22 |
| | Management guarantee (B3) | Teaching plan perfection | B31 |
| | | Quality supervision and sound | B32 |
| Course implementation process (C) | Course content (C1) | Moderate | C11 |
| | | Strong practicality | C12 |
| | Teaching behavior (C2) | Take lessons carefully | C21 |
| | | Artistic teaching | C22 |
| | | Demonstration | C23 |
| | Teaching mode (C3) | In a way | C31 |
| | | Unity of knowledge | C32 |
| Course results (D) | Goal reach (D1) | Thought target | D11 |
| | | Knowledge target | D12 |
| | | Behavior target | D13 |
| | | Ability target | D14 |
| | Class satisfaction (D2) | Course setting | D21 |
| | | Teaching process | D22 |

## 2.1.2. Revised screening of evaluation indicators

The questionnaire on the applicability of the evaluation indexes of English courses in colleges and universities is compiled according to the actual situation of English in colleges and universities and the specific requirements of the Delphi method. In the questionnaire, the degree of applicability of the proposed evaluation indexes is divided into five different levels, namely, “very applicable, applicable, generally applicable, not applicable, and not applicable”, with reference to the Likert scale. In addition, in order to facilitate the experts to fill in and understand the questionnaire, necessary item descriptions were made before the questionnaire items. At the same time, in order to facilitate experts to put forward their opinions or suggestions on the modification of their own indicators that are more in line with the actual situation of universities, a blank comment column is set after each indicator question. In order to test the participating experts' understanding of the research field and the evaluation indexes set, five different levels of familiarity based on the Likert scale are set at the end of the questionnaire: “very familiar, familiar, generally familiar, not too familiar, very unfamiliar”.

(1) Basic information of experts

This study used the Delphi method [21] to conduct two rounds of questionnaire surveys on experts about the applicability of evaluation indexes of English major courses in colleges and universities, and the composition of experts should be 8-20 people, the first round of the study selected 17 experts, but there were 16 experts who participated effectively, so the second round of the same 16 experts were selected for questionnaire consultation, which included teachers with senior titles engaged in the work of Civics and Political Science in secondary schools and a total of 7 teachers with PhDs specializing in vocational education and 4 researchers of the Bureau of Education in vocational education. administrators, 5 PhDs specializing in vocational education, and 4 researchers of the Bureau of Education's Civic and Political Work in Vocational Education, in order to maximize the scientific validity of the survey results.

(2) Analysis of the degree of authority of experts

The academic field generally measures the degree of authority of experts by calculating the coefficient of authority of experts (Cr), and the factors governing the size of the value of Cr are summarized as “the coefficient of familiarity of experts with the indicators (Cs)” and “the coefficient of the degree of influence of different bases of judgment on the experts (Ca)” two aspects. Therefore, it is customary in research to use the formula Cr=(Cs+Ca)/2 to calculate the authority coefficient of an expert. The size of the Cr value thus calculated is directly proportional to the degree of authority of the expert

being consulted, i.e., the larger the value of the Cr obtained, the higher the authority of the expert being consulted, and the more authentic and reliable the results of the survey will be.

Based on the Likert scale, this study classifies the familiarity of the consulted experts with the proposed evaluation indicators of English courses in colleges and universities into five levels, from very familiar to very unfamiliar, and each level of familiarity corresponds to the quantitative value of "1, 0.7, 0.4, 0.1, and 0". The experts' familiarity with the first-level indicators of the evaluation of English courses in colleges and universities was investigated in the expert consultation questionnaire, and the results are shown in Table 2. It can be seen that the authority coefficient of the consulted experts is 0.85, which indicates that the participating experts are very familiar with the research in the field related to the evaluation system of English major courses in colleges and universities, and have a high degree of credibility.

***Table 2.*** Experts are familiar with the evaluation indicators

| Primary indicator | Very familiar with | Familiar with | General familiarity | Be unfamiliar with | Very unfamiliar | Total amount | Cs |
|---|---|---|---|---|---|---|---|
| A | 11 | 5 | 0 | 0 | 0 | 16 | 0.86 |
| B | 10 | 4 | 2 | 0 | 0 | 16 | 0.85 |
| C | 8 | 8 | 0 | 0 | 0 | 16 | 0.86 |
| D | 9 | 6 | 1 | 0 | 0 | 16 | 0.84 |

(3) Revision of the screening of three-level indicators

In the boundary values of two level 3 indicators, B13 "Teacher structure" and C21 "Careful preparation for lessons", the full score frequency is less than 58.42%, the arithmetic mean is less than 4.52, and the coefficient of variation is less than 0.12, and the scores do not meet the requirements of the indicators to be retained. The results of the scores do not meet the requirements for the indicators to be retained. Therefore, they were deleted from the proposed indicator system.

## 2.1.3. Finalization of the evaluation system

Based on the results of the screening of course evaluation indicators in the two rounds of survey and the streamlining and revision of the connotation of specific criteria, this study finally established the course evaluation system for English majors in colleges and universities, and the finalized specific indicator system is shown in Table 3. The number of three-level indicators was reduced to 22 from 24 in the preliminary proposed system.

***Table 3.*** The final metric system is proposed

| Primary indicator | Secondary indicator | Tertiary index | Index number |
|---|---|---|---|
| Foundation of curriculum construction (A) | Curriculum awareness (A1) | Curriculum education is clear | A11 |
| | | Clear course positioning | A12 |
| | Culture target (A2) | Course docking | A21 |
| | | Target setting commensurate height | A22 |
| Class configuration (B) | Teacher status (B1) | Teacher quality | B11 |
| | | Teacher size | B12 |
| | Course setting (B2) | Standard of teaching materials | B21 |
| | | Appropriateness | B22 |
| | Management guarantee (B3) | Teaching plan perfection | B31 |
| | | Quality supervision and sound | B32 |
| Course implementation process (C) | Course content (C1) | Moderate | C11 |
| | | Strong practicality | C12 |
| | Teaching behavior (C2) | Artistic teaching | C22 |
| | | Demonstration | C23 |
| | Teaching mode (C3) | In a way | C31 |
| | | Unity of knowledge | C32 |
| Course results (D) | Goal reach (D1) | Thought target | D11 |
| | | Knowledge target | D12 |
| | | Behavior target | D13 |
| | | Ability target | D14 |
| | Class satisfaction (D2) | Course setting | D21 |
| | | Teaching process | D22 |

## *2.2. Determination of evaluation indicator weights*

### 2.2.1. Topological Hierarchy Analysis (THA)

Expandable Hierarchical Analysis Method (EAHP) [22] transforms specific values into intervals, which conforms to the ambiguity given by experts in judgment, and at the same time makes up for the defect of losing theoretical significance when the hierarchical analysis method does not have consistency, so that the results are objective and accurate. After constructing the index system of hierarchy, experts are invited to compare all the indexes of the same hierarchy two by two, and construct the judgment matrix $A=\left(a_{ij}\right)_{n\times n}$, $i,j=1,2,\ldots n$, $A$ as positive and negative judgment matrix, and $a_{ij}=\left\langle a_{ij}^{-},a_{ij}^{+}\right\rangle$ represents the number of intervals in the $i$ th row and $j$ th column of the judgment matrix, in which $a_{ij}^{-}$ and $a_{ij}^{+}$ represent the upper endpoints and lower endpoints of the intervals, respectively.

$A=\left\langle A^{-},A^{+}\right\rangle$ represents the topable judgment matrix, where $A^{-}$ and $A^{+}$ represent the inverse matrix composed of the upper limit and the positive matrix composed of the lower limit of the topable interval, respectively. The calculation steps are as follows.

(1) Calculate the positive vectors corresponding to the largest eigenvalues of $A^{-}$ and $A^{+}$, and then normalize them to obtain the corresponding eigenvectors $x^{-}$ and $x^{+}$, where the eigenvectors are solved by the square root method.

(2) $A^{-}=\left(a_{ij}^{-}\right)_{n\times n}$, $A^{+}=\left(a_{ij}^{+}\right)_{n\times n}$, $i,j=1,2\ldots n$, solve for the real numbers $k$ and $m$. That is:

$$\begin{cases} k=\sqrt{\sum_{j=1}^{n}1\Big/\sum_{1}^{n}a_{ij}^{+}} \\ m=\sqrt{\sum_{j=1}^{n}1\Big/\sum_{1}^{n}a_{ij}^{-}} \end{cases} \tag{1}$$

$k$, $m$ satisfy $0<kx^{-}\le mx^{+}$, and $0\le k\le 1\le m$, indicating that the consistency of the topological judgment matrix is satisfied:

$$S=\left(S_1,S_2,\ldots,S_n\right)^{T}=\left\langle kx^{-},mx^{+}\right\rangle \tag{2}$$

Suppose $S_i=\left\langle S_i^{-},S_i^{+}\right\rangle$, $S_j=\left\langle S_j^{-},S_j^{+}\right\rangle$, $V\left(S_i,S_j\right)\ge 0$, then denote the possible degree of $S_i\ge S_j$, where $i\ne j$, $i,j=1,2,\ldots n$, then there is:

$$\begin{cases} P_j=1 \\ P_i=V\left(S_i,S_j\right)=\dfrac{2\left(S_i^{+}-S_j^{-}\right)}{\left(S_i^{+}-S_i^{-}\right)+\left(S_j^{+}-S_j^{-}\right)} \end{cases} \tag{3}$$

where $P_i$ is the single ordering of the $i$ nd element of a certain level to an element of the previous level, after normalization, we can get $P=\left(P_1,P_2,\ldots,P_n\right)^{T}$, which represents the weight vector of each element of a certain level to the single ordering of an element of the previous layer. $S_i^{-},S_i^{+},S_j^{-},S_j^{+}$ are the upper and lower endpoints of the two single-layer weights topable intervals, respectively.

By the method described above, the vector of all single-layer sort weights $P_h^{k}=\left(P_{1h}^{K},P_{2h}^{K},\ldots,P_{n_k h}^{K}\right)^{T}$ is computed, where $k$ refers to the $k$ rd layer and $h$ to the $h$ th element. When $h=\left(1,2,\ldots n_{k-1}\right)$, the $n_k\times n_{k-1}$ matrix $P^{k}$ can be derived:

$$P^{k}=\left(P_1^{k},P_2^{k},\ldots,P_{n_{k-1}}^{k}\right)^{T} \tag{4}$$

If the ranking weight vector of layer $k-1$ to the target layer is $W^{k-1}=\left(W_1^k,W_2^{k-1},\ldots,W_{n_{k-1}}^{k-1}\right)^T$, then the ranking of all elements of layer $k$ to the target layer $W^k$ is:

$$W^k=\left(W_1^k,W_2^k,\ldots,W_{n_{k1}}^k\right)^T=P^kW^{k-1} \tag{5}$$

## 2.2.2. The DEMATEL empowerment methodology

(1) Determine the direct impact matrix

According to the evaluation index system constructed in the previous section, in order to construct the network relationship diagram of evaluation indexes, it is necessary to firstly make two-by-two judgments on the impact relationship and the degree of impact of all the indexes and form the impact relationship matrix, and the scoring scale adopts the scoring method from 0 to 4, including 0 (no impact), 1 (slight impact), 2 (some impact), 3 (obvious impact), 4 (huge impact).

The result of each expert's rating is represented by matrix $^{(s)}=\left[x_{ij}^{(s)}\right]_{n\times n}$, where $x_{ij}^{(s)}$ represents the degree of influence of the indicator $A_i$ on the indicator $A_j$ as perceived by the $S$ rd expert, and $n$ the number of indicators. The $S$ experts will form $S$ a matrix of order $n$, and then the evaluation matrix of the $S$ experts will be processed according to the following formula:

$$\overline{x}=\frac{1}{s}\sum_{s=1}^{s}x_{ij}^{(s)},i,j=1,2,3,\cdots,n \tag{6}$$

In the conversion of expert scores to a direct impact matrix, after removing the highest and lowest scores, the average of the scores is converted to segmented scores with the following segmentation rules:

$$a_{ij}=\begin{cases}0 & 0\le\overline{x}<0.5\\ 1 & 0.5\le\overline{x}<1.5\\ 2 & 1.5\le\overline{x}<2.5\\ 3 & 2.5\le\overline{x}<3.5\\ 4 & 3.5\le\overline{x}<4\end{cases} \tag{7}$$

Obtain the direct influence matrix $A=\left[a_{ij}\right]_{n\times n}$.

(2) Normalized direct influence matrix

Normalize the direct influence matrix to obtain the normalized direct influence matrix $B=\left[b_{ij}\right]_{n\times n}$, where the value of each element of the matrix lies between $[0,1]$:

$$B=\frac{1}{\max\limits_{1\le i\le n}\sum\limits_{j=1}^{n}a_{ij}}A \tag{8}$$

where $\max\limits_{1\le i\le n}\sum\limits_{j=1}^{n}a_{ij}$ is the maximum value of the row sum.

(3) Calculate the comprehensive impact matrix

Matrix $B$ can represent the direct impact of the relationship between the indicators, but the actual evaluation system often need to consider the indirect impact of different evaluation indicators. Comprehensive impact matrix $T$ can represent the final impact level of the indicators on the evaluation system, and show the complete impact relationship between the indicators [23]. Limit processing of matrix $B$, to obtain the integrated impact matrix $T=\left[t_{ij}\right]_{n\times n}$. That is:

$$T=\left(B+B^2+\cdots+B^n\right)=\sum_{n=1}^{\infty}B^n=B\frac{I-B^{n-1}}{I-B} \tag{9}$$

Since in matrix $B$, $b_{ij}\in[0,1]$, when $n\to\infty$, $B^{n-1}\to 0$, there is:

$$T = B(I - B)^{-1} \tag{10}$$

where $I$ is the unit matrix.

(4) Determine the overall impact matrix

Considering the role of the indicators in influencing themselves, the overall impact matrix $H$ of the indicator system is obtained by adding the comprehensive impact matrix with the unit matrix $I$:

$$H = T + I = \left[ h_{ij} \right]_{n \times n} \tag{11}$$

(5) Determine the degree of centrality and the degree of cause

First, calculate the indicator's Influence $\left(F_i\right)$ (the sum of the indicator's influence on other indicators) and Influenced $\left(E_i\right)$ (the sum of the indicator's influence by other indicators):

$$F_i = \sum_{j=1}^{n} t_{ij}, i = 1, 2, \cdots, n \tag{12}$$

$$E_i = \sum_{j=1}^{n} t_{ji}, i = 1, 2, \cdots, n \tag{13}$$

Then calculate the degree of center $M_i$ and the degree of cause $R_i$ according to the following formula:

$$M_i = F_i + E_i, i = 1, 2, \cdots, n \tag{14}$$

$$R_i = F_i - E_i, i = 1, 2, \cdots, n \tag{15}$$

Centrality $M_i$ is the degree of influence that Indicator $S_i$ plays a role in the overall system. Causality $R_i$ is the degree of influence of indicator $S_i$ in the system. When $R_i$ is positive, it means that the influence effect of the indicator is mainly reflected in the influence of the indicator on other indicators, so the indicator is called the cause factor; $R_i$ is negative, it means that the influence effect of the indicator is mainly reflected in the influence of the indicator by other indicators, and this time the indicator is the result factor.

### 2.2.3. Comprehensive weight assignment methods

The steps of the EAHP-DEMATEL method for assigning the evaluation indexes of English major courses in colleges and universities are shown in Figure 1. The EAHP method of determining the relative importance of indicators only considers the influence of lower-level indicators on the upper-level indicators, and treats the evaluation indicators at the same level as completely independent factors, without taking into account the influence of the relationship between the evaluation indicators, but in the actual evaluation process of English professional courses in colleges and universities, there are complex dependencies and interactions among the indicators, which are not isolated factors. When utilizing the DEMATEL method to determine the impact relationship and degree of influence of indicators, all indicators are regarded as equally important by default, however, in practice, the importance of each indicator is often emphasized and there are certain differences. In view of the complementary nature of the two methods mentioned above, this paper considers coupling the two methods to improve the effectiveness, rigor and scientificity of the weights, and obtains a hybrid weight that takes into account the influence of the relationship between the indicators, but also reflects the difference in the degree of importance of the indicators, which is a more comprehensive and realistic picture of the operation of rural water supply projects.

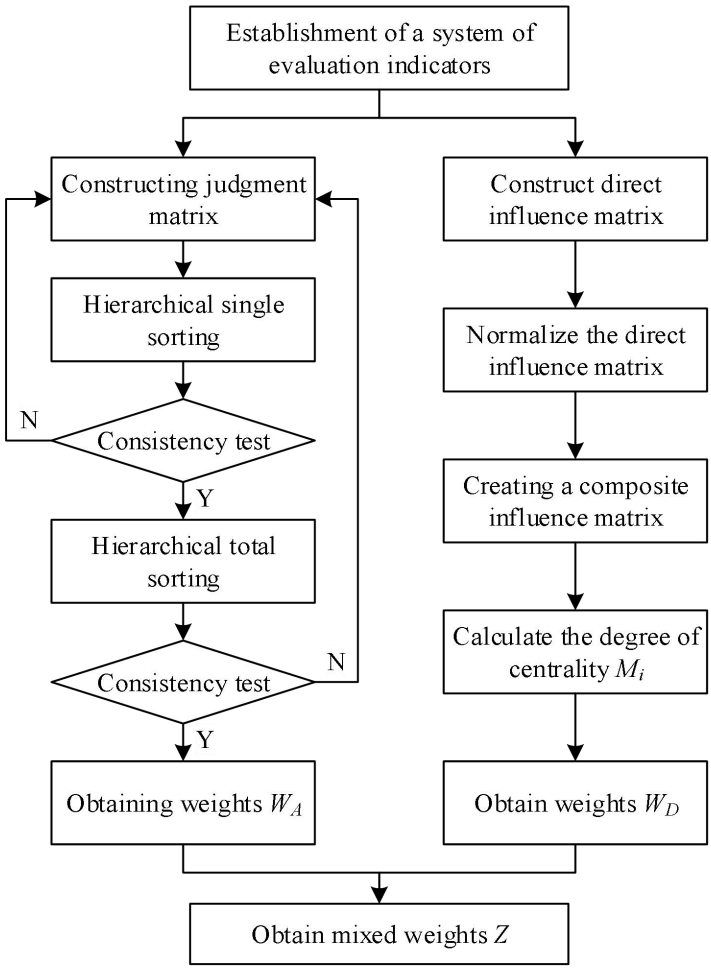



***Figure 1.*** Mixed weight calculation process

## *2.3. Evaluation methods based on cloud modeling*

Combining the above index weight assignment methods, this paper utilizes cloud model [24] to realize the intelligent evaluation of English professional courses in colleges and universities. Assume that $U$ consists of quantitative values represented by a quantitative thesis, and $C$ represents a qualitative expression within the thesis $U$. When the quantitative values $x$ generated randomly at a time by the qualitative expression $C$ belong to within the thesis $U$ and satisfy the degree of affiliation $\mu(x)_c \in [0,1]$ of $x$ to $C$, the mapping of all $x$ on the thesis $U$ is called a cloud, and a single $x$ denotes a cloud drop.

(1) Numerical characterization of cloud models

The degree of randomness and ambiguity of the cloud model is realized through the three numerical features of expectation, entropy, and hyperentropy, which are commonly used to be expressed by $C(Ex, En, He)$.

Expectation $Ex$ is the central value of the distribution of cloud droplet $x$ in domain $U$, which in this paper represents the value of the evaluation index of English courses in colleges and universities, and the larger the expectation value, the higher the green grade of the evaluation of English courses in colleges and universities.

Entropy $En$ is a measure of uncertainty of qualitative concepts, the larger the $En$ the larger the span of cloud droplets, the greater the degree of ambiguity. In this paper, it refers to the consistency of the expert group's scoring of the evaluation indexes of college English professional courses, and the larger the entropy value is, the greater the divergence of the expert group's evaluation of college English professional courses, and vice versa, the smaller it is.

Hyperentropy $He$ is the uncertainty of the metric entropy. In this paper, it means that the evaluation results of college English professional course evaluation have stability.

(2) Cloud generator

Cloud generator is divided into forward cloud generator and reverse cloud generator.

(3) Procedures for evaluating the evaluation of English major courses in colleges and universities based on the cloud model

The first step determines and calculates the standard cloud parameters. In this paper, the range of evaluation indexes corresponding to the evaluation level of English courses in colleges and universities is used as a basis for determining the standard cloud parameter $\left(E_{x_{s'}}, E_{n_{s'}} H_{e_s}\right)$ process as follows:

$$E_{x_s} = \begin{cases} F_s \min, s = 1 \\ \dfrac{F_s \max + F_s \min}{2}, 1 < s < b \\ F_s \max, i = b \end{cases} \tag{16}$$

$$E_{n_s} = \begin{cases} \dfrac{F_s \max - F_s \min}{6}, 1 < s < b \\ \dfrac{F_s \max - F_s \min}{3}, s = 1 \ Or \ b \end{cases} \tag{17}$$

$$H_{e_s} = k \tag{18}$$

where $F_i \max$ and $F_i \min$ are the maximum and minimum boundaries of each evaluation interval, $s$ is the standard cloud level, $b$ is the interval serial number, and $k$ is a constant representing the fuzzy degree of the variable, which should be constantly adjusted to fit with the actual evaluation level cloud map of English courses in colleges and universities.

Calculate the evaluation index cloud parameters by importing the values $x_i$ of the experts' ratings of each index to the inverse generator and transforming them into the base cloud $x_i\left(E_{x_i}, E_{n_i}, H_{e_i}\right)$. The calculation process of the inverse cloud generator is as follows.

Calculate the mean value $\overline{X}$:

$$\overline{X_i} = \frac{1}{n}\sum_{j=1}^{n} x_{ij} \tag{19}$$

Calculate the variance:

$$S^2 = \frac{1}{n-1}\sum_{j=1}^{n}\left(x_{ij} - E_{x_i}\right)^2 \tag{20}$$

Compute cloud parameters:

$$\begin{cases} E_{x_i} = \dfrac{1}{n}\sum_{j=1}^{n} x_{ij} \\ E_{n_i} = \sqrt{\dfrac{\pi}{2}} \cdot \dfrac{1}{n}\sum_{j=1}^{n}\left|x_{ij} - E_{x_i}\right| \\ H_{e_i} = \sqrt{\left|S_i^2 - E_{n_i}^2\right|} \end{cases} \tag{21}$$

where $x_{ij}$ is the value of the $j$ nd expert's score for the $i$ rd indicator, $i = 1, 2\ldots, m$, $j = 1, 2\ldots, n$.

The second step of the integrated cloud parameter calculation. According to the previous topological hierarchical analysis method for indicator weights, the cloud parameters of the first level indicators and the target level are calculated using the fusion algorithm:

$$\begin{cases} E_x = \sum_{i=1}^{m} E_{x_i} \cdot \omega_i \\ E_n = \sqrt{\sum_{i=1}^{m} E_{n_i}^2 \cdot \omega_i} \\ H_e = \sum_{i=1}^{m} H_{e_i} \cdot \omega_i \end{cases} \tag{22}$$

The third step generates the evaluation cloud of English major courses in colleges and universities. Using MATLAB2020 software to write the code of the forward cloud generator, we can get the comprehensive evaluation cloud of the evaluation grade of English major courses in colleges and universities.

## 3. Results and discussion

### *3.1. Results of the calculation of indicator weights*

#### 3.1.1. Indicator aggregate impact relationships

Based on the basic idea of DEMATEL method, 16 experts who scored in the index screening session of this paper were invited to provide relevant information and introduce the scoring rules, and the experts repeatedly explored the mutual influence relationship among the indicators of four aspects, namely, the foundation of course construction, the configuration of course structure, the process of course implementation, and the effect of course acquisition, according to the above proposed formula of DEMATEL method. According to the formula of DEMATEL method, the degree of influence, degree of being influenced, degree of centrality, degree of cause and subjective weight of each index are calculated, and the comprehensive influence relationship of each index in the evaluation index system of English courses in colleges and universities is shown in Table 4. From the results, it can be seen that there are 7 indicators with a centrality higher than the average level (5.376), which are A11 "clear curriculum education concept", A12 "clear curriculum positioning", A21 "curriculum goal docking", C12 "strong practicality", C22 "teaching artistry", C23 "words and deeds standardization", and D22 "teaching process". This paper shows that these seven factors are the key influencing factors for the evaluation of college English major courses.

***Table 4.*** Comprehensive impact relationship table

| Index layer | Influence degree | Influence degree | Center degree | Reason degree |
|---|---|---|---|---|
| A11 | 3.513 | 2.885 | 6.154 | 0.0662 |
| A12 | 2.583 | 3.138 | 6.129 | 0.0294 |
| A21 | 2.256 | 2.887 | 5.839 | 0.0982 |
| A22 | 3.273 | 2.807 | 5.708 | 0.1192 |
| B11 | 2.941 | 2.45 | 4.669 | 0.0086 |
| B12 | 3.627 | 3.109 | 5.139 | 0.1157 |
| B21 | 3.276 | 2.257 | 5.105 | 0.0308 |
| B22 | 2.933 | 3.016 | 4.582 | 0.093 |
| B31 | 3.299 | 2.701 | 5.641 | 0.0853 |
| B32 | 3.039 | 3.03 | 4.84 | 0.0913 |
| C11 | 2.597 | 2.363 | 5.053 | 0.0083 |
| C12 | 2.376 | 2.53 | 6.14 | 0.0737 |
| C22 | 2.725 | 3.095 | 5.977 | 0.0004 |
| C23 | 3.342 | 2.288 | 5.741 | 0.0998 |
| C31 | 2.573 | 2.135 | 4.6 | 0.0946 |
| C32 | 3.347 | 2.83 | 4.575 | 0.024 |
| D11 | 2.29 | 2.535 | 5.375 | 0.1033 |
| D12 | 2.564 | 3.156 | 5.592 | 0.0203 |
| D13 | 2.602 | 3.011 | 5.627 | 0.102 |
| D14 | 3.636 | 2.34 | 5.353 | 0.0215 |
| D21 | 2.306 | 2.784 | 4.569 | -0.0176 |
| D22 | 3.019 | 2.391 | 5.873 | 0.1048 |

### 3.1.2. Results of indicator empowerment

In this paper, the fuzzy DEMATEL method is combined with the improved AHP method to comprehensively analyze the influence relationship between the indicators of each factor and calculate the comprehensive weights of the indicators to improve the accuracy and scientificity of the weights. The subjective weights of each factor determined by the improved AHP method are recorded as the initial weights, and on the basis of the initial weights, the fuzzy DEMATEL method is used to optimize the weights to obtain the comprehensive weights, and the results of the comprehensive weights of the evaluation indexes of English major courses in colleges and universities are shown in Table 5. According to the comprehensive weights shown in the data, C31 “rich teaching methods” (0.089) is still the most important factor affecting the evaluation of English courses in colleges and universities. Next, D11 “ideological goals” and D21 “curriculum” indicators have a combined weight value of 0.087.

***Table 5.*** Combined weight results

| Primary indicator | Tertiary index | Index number | Center degree | Weighting | Composite weight |
|---|---|---|---|---|---|
| Foundation of curriculum construction (A) | Curriculum education is clear | A11 | 6.154 | 0.0019 | 0.0021 |
| | Clear course positioning | A12 | 6.129 | 0.01 | 0.012 |
| | Course docking | A21 | 5.839 | 0.032 | 0.029 |
| | Target setting commensurate height | A22 | 5.708 | 0.074 | 0.078 |
| Class configuration (B) | Teacher quality | B11 | 4.669 | 0.018 | 0.015 |
| | Teacher size | B12 | 5.139 | 0.07 | 0.072 |
| | Standard of teaching materials | B21 | 5.105 | 0.011 | 0.014 |
| | Appropriateness | B22 | 4.582 | 0.013 | 0.011 |
| | Teaching plan perfection | B31 | 5.641 | 0.028 | 0.025 |
| | Quality supervision and sound | B32 | 4.84 | 0.043 | 0.048 |
| Course implementation process (C) | Moderate | C11 | 5.053 | 0.0821 | 0.0803 |
| | Strong practicality | C12 | 6.14 | 0.011 | 0.014 |
| | Artistic teaching | C22 | 5.977 | 0.051 | 0.052 |
| | Demonstration | C23 | 5.741 | 0.081 | 0.085 |
| | In a way | C31 | 4.6 | 0.081 | 0.089 |
| | Unity of knowledge | C32 | 4.575 | 0.056 | 0.054 |
| Course results (D) | Thought target | D11 | 5.375 | 0.083 | 0.087 |
| | Knowledge target | D12 | 5.592 | 0.011 | 0.009 |
| | Behavior target | D13 | 5.627 | 0.069 | 0.054 |
| | Ability target | D14 | 5.353 | 0.034 | 0.035 |
| | Course setting | D21 | 4.569 | 0.09 | 0.087 |
| | Teaching process | D22 | 5.873 | 0.05 | 0.0476 |

## *3.2. Empirical analysis of curriculum evaluation system*

### 3.2.1. Selection of evaluation targets

In order to better test the practicality and applicability of the evaluation index system of English major courses in colleges and universities constructed in this paper, the English major courses in college H were selected for evaluation in this paper.

University H is a national key university directly under the Ministry of Education. After more than 60 years of construction and development, University H has become a comprehensive research university that specializes in engineering, combines science and technology, and coordinates the development of multiple disciplines such as management, economics, literature, law and medicine. In order to conscientiously implement the spirit of the Outline of the National Medium- and Long-term Education Reform and Development Plan (2010-2020) and the Outline of the Medium- and Long-term Education Reform and Development Plan of Province G, H University has formulated the English Teaching Curriculum Construction Plan with the core of cultivating "three innovations" (innovation, creativity and entrepreneurship) talents with international vision and international communication skills. Ensure the quality of teaching and learning in English majors.

In terms of the management of the curriculum, the school has set up a special organizational structure. In order to ensure the teaching quality of English major courses and strengthen the guidance and

supervision of the teaching of English major courses, H University has established the "English Teaching Leading Group", which consists of the "English Teaching Expert Group" and the "English Teaching Office". The members of the "English Teaching Expert Group" are composed of members of the school's teaching steering committee with English communication skills, and are responsible for the evaluation, assessment and acceptance of English course teaching majors and courses, and the "English Language Teaching Office" is responsible for the daily management of English major course teaching.

### 3.2.2. Standard cloud analysis results

In this paper, the evaluation grades of English major courses in colleges and universities are standardized into intervals whose thesis domains are all [0, 1], and the grade intervals of each indicator are transformed into standard cloud digital features. Due to the small amount of data, this paper represents the evaluation thesis through the golden section method, divides the thesis domain [0, 1] into five evaluation grades, and establishes the evaluation standard cloud of evaluation indexes of English major courses in colleges and universities. Set 0.61 as the multiplier between the cloud model parameters of adjacent grades, and the closer to the center region of the thesis domain [0, 1], the smaller the entropy and hyperentropy values of the evaluation grades. Taking the thesis domain [0, 1] as the center point and 0.500 as the intermediate evaluation grade, the cloud model parameters Ex=0.500 and He=0.005 are taken.The specific values of the standard cloud are shown in Table 6. Through MATLAB programming to get the evaluation grade standard cloud diagram of college English professional course is shown in Figure 2. Among them, grades V1-V5 represent five levels of college English major course evaluation grades of very poor, poor, average, good and excellent, respectively, with pink, orange, green, blue and purple as the feedback colors.

***Table 6.*** Standard cloud model eigenvalues for each indicator

| Grade | Evaluation value | Assessment standard | Evaluation feedback signal |
|---|---|---|---|
| V1 | (0.000,0.105,0.016) | Very bad | Pink |
| V2 | (0.352,0.062,0.009) | Worse | Orange |
| V3 | (0.500,0.042,0.008) | General | Green |
| V4 | (0.694,0.058,0.007) | Good | Blue |
| V5 | (1.000,0.108,0.016) | Excellence | Purple |

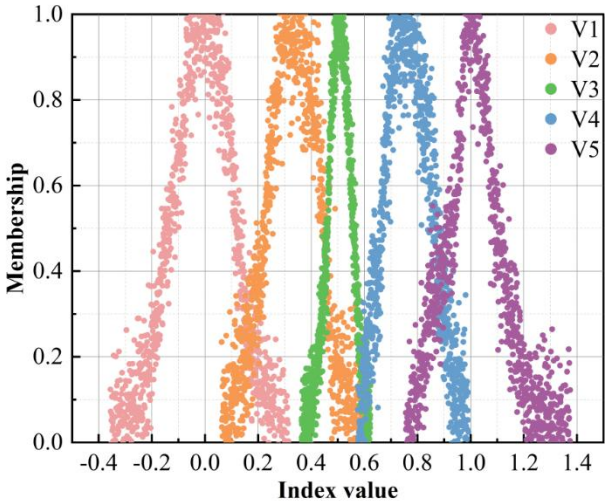



***Figure 2.*** Standard evaluation cloud map

### 3.2.3. Analysis of cloud assessment results

Using the cloud evaluation model and the evaluation index weights of English courses in colleges and universities, the cloud eigenvalues of the evaluation indexes of English courses in colleges and universities are calculated, and the cloud numerical eigenvalues of each three-level index are shown in Table 7. Among them, the Ex, En and He eigenvalues of A11 “clear educational philosophy of the course” indicator are 0.4226, 0.2152 and 0.0834 respectively.

***Table 7.*** Tertiary indicator cloud digital eigenvalues

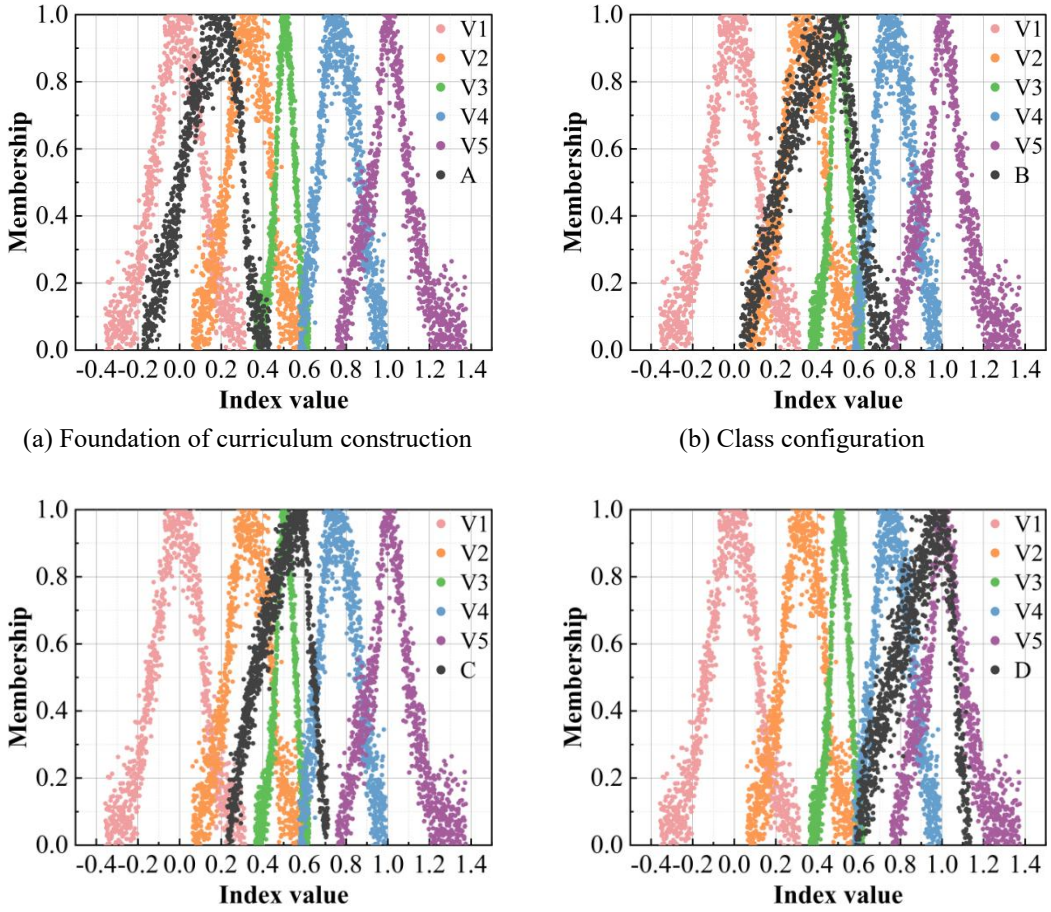
| Primary indicator | Tertiary index | Index number | Ex | En | He |
|---|---|---|---|---|---|
| Foundation of curriculum construction (A) | Curriculum education is clear | A11 | 0.4226 | 0.2152 | 0.0834 |
| | Clear course positioning | A12 | 0.3595 | 0.2501 | 0.1038 |
| | Course docking | A21 | 0.5131 | 0.2646 | 0.1434 |
| | Target setting commensurate height | A22 | 0.4514 | 0.2756 | 0.1205 |
| Class configuration (B) | Teacher quality | B11 | 0.254 | 0.2961 | 0.1175 |
| | Teacher size | B12 | 0.2373 | 0.2334 | 0.1278 |
| | Standard of teaching materials | B21 | 0.7583 | 0.219 | 0.1228 |
| | Appropriateness | B22 | 0.3501 | 0.2284 | 0.106 |
| | Teaching plan perfection | B31 | 0.7977 | 0.1146 | 0.0731 |
| | Quality supervision and sound | B32 | 0.2133 | 0.2211 | 0.1334 |
| Course implementation process (C) | Moderate | C11 | 0.4658 | 0.1618 | 0.116 |
| | Strong practicality | C12 | 0.3782 | 0.1959 | 0.1289 |
| | Artistic teaching | C22 | 0.7298 | 0.1162 | 0.1399 |
| | Demonstration | C23 | 0.4699 | 0.2433 | 0.1298 |
| | In a way | C31 | 0.7165 | 0.2551 | 0.1204 |
| | Unity of knowledge | C32 | 0.584 | 0.1605 | 0.0866 |
| Course results (D) | Thought target | D11 | 0.3046 | 0.1789 | 0.1422 |
| | Knowledge target | D12 | 0.4873 | 0.1118 | 0.1448 |
| | Behavior target | D13 | 0.688 | 0.2497 | 0.136 |
| | Ability target | D14 | 0.5723 | 0.1936 | 0.0931 |
| | Course setting | D21 | 0.4928 | 0.1448 | 0.1311 |
| | Teaching process | D22 | 0.275 | 0.2483 | 0.0942 |

After calculating the cloud digital eigenvalues corresponding to the indicators of the three-level indicator layer, the results obtained from the calculation are then used to calculate the cloud digital eigenvalues of the second-level and first-level indicators through the formula, and the results of the analysis of the cloud digital eigenvalues of the first- and second-level indicators of the evaluation of the English major course in college H are shown in Table 8. At the same time, the programming of MATLAB software is used to complete the drawing of the evaluation cloud diagram of the first-level indicators in the evaluation of English major courses in colleges and universities H. The specific results are shown in Fig. 3, where (a)-(d) represent the evaluation cloud diagrams of the basis of the course construction, the configuration of the course structure, the process of the course implementation, and the course obtaining effect, respectively. The figure represents the evaluation cloud of English major courses in colleges and universities at the indicator level. According to the overlap between the actual evaluation cloud and the evaluation standard cloud, it can be found that the evaluation cloud of the A "Curriculum Construction Foundation" index of the H English major course in colleges and universities is between "poor" and "very poor", which is biased towards the "poor" standard cloud, and the peak membership (1.0) appears in the index value of about 0.190, indicating that the evaluation result of this index is poor. Similarly, B "Course Structure Configuration", C "Course Implementation Process" and D "Course Effectiveness" are rated as Fair, Fair, and Excellent.

To sum up, the content of the English major course in college H is extensive, covering a wide range of aspects such as interrogative pronoun question construction, date and time expressions, orientation expressions, existential sentence patterns, dynamic auxiliaries, comparative sentences, complements and adverbs, and so on. However, the whole set of teaching course objectives and cultivation objectives are not closely connected, and the logical levels of the objectives are not set clearly enough. This requires that the positioning of the courses in the curriculum system of future English majors should be confirmed clearly, set up in accordance with the cultivation objectives, and fully realize the interface between the course objectives and the cultivation objectives. In terms of the teaching plan and teaching objectives, the teaching plan and specific learning objectives should be carefully planned, and the core content of the corresponding courses should be clearly identified in the titles of the lectures, so as to ensure that the students can understand the contents of what they have learned before the class.

***Table 8.*** Results of the cloud digital eigenvalue of primary and secondary indicators

| Primary indicator | Secondary indicator | | Ex | En | He |
|---|---|---|---|---|---|
| Foundation of curriculum construction (A) (0.5263,0.1954,0.0652) | Curriculum awareness | A1 | 0.5344 | 0.151 | 0.0882 |
| | Culture target | A2 | 0.4553 | 0.1646 | 0.0572 |
| Class configuration (B) (0.5263,0.1524,0.0632) | Teacher status | B1 | 0.6806 | 0.1635 | 0.0673 |
| | Course setting | B2 | 0.5421 | 0.1923 | 0.0815 |
| | Management guarantee | B3 | 0.5741 | 0.184 | 0.054 |
| Course implementation process (C) (0.5563,0.1624,0.0524) | Course content | C1 | 0.4939 | 0.1818 | 0.0763 |
| | Teaching behavior | C2 | 0.7898 | 0.1963 | 0.0535 |
| | Teaching mode | C3 | 0.404 | 0.1766 | 0.0755 |
| Course results (D) (0.6235,0.18952,0.0825) | Goal reach | D1 | 0.6075 | 0.1845 | 0.053 |
| | Class satisfaction | D2 | 0.587 | 0.1741 | 0.0583 |




(a) Foundation of curriculum construction

(b) Class configuration

(c) Course implementation process

(d) Course results

***Figure 3.*** Cloud map of the evaluation of the university of college H

## 4. Conclusion

In this paper, we use the EAHP-DEMATIL method to weight the indicators in the evaluation system of college English majors, and find that C31 "rich teaching methods" (0.089) is the most important factor affecting the evaluation of college English major courses. This was followed by D11 "Ideological Goals" and D21 "Curriculum Setting", both with a comprehensive weight of 0.087. The results show that in the first-level indicators of the evaluation system of H English major courses in colleges and universities, A "course construction foundation" and D "course acquisition effect", the two evaluation clouds are between "poor" standard cloud and "very poor" standard cloud, "good" standard cloud and "excellent" standard cloud, respectively, and the central index values (1.190 and 0.969) are biased towards "poor" standard cloud and "excellent" standard cloud, respectively. The results show that the evaluation grades of H English major courses in colleges and universities are poor and excellent in terms of course

construction foundation and course acquisition effect, respectively. The curriculum positioning in the curriculum system of the English major of the school should be confirmed and clear, set in line with the training objectives, and fully realize the docking of the curriculum objectives and the training objectives.

The above results prove the effectiveness of the application of the curriculum evaluation reform system for English majors in colleges and universities proposed in this paper, and in the future, we can promote the quality construction of English majors in colleges and universities through this study, improve the teaching level of English majors in colleges and universities, and finally reach the goal of modernizing the cultivation of high-quality talents.

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