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Evaluation of College Teachers' Engagement in Chinese Higher Education Using a Fuzzy Entropy Weight and Fuzzy-Grey Correlation Approach

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Abstract: A scientifically rigorous evaluation of college teachers' engagement is essential for enhancing human resource management practices within higher education institutions. In this study, a fuzzy decision-making framework was constructed to facilitate the objective assessment of college teachers' engagement in Chinese universities. Drawing on Rich's tripartite conceptualization of engagement—comprising cognitive focus, emotional involvement, and behavioral effort—a hierarchical evaluation index system was developed, consisting of three primary dimensions and seventeen secondary indicators. To address the inherent uncertainty and subjectivity in engagement assessment, a fuzzy entropy weight method was employed to determine the relative importance of each indicator. Subsequently, a novel fuzzy-grey correlation evaluation method was proposed, integrating grey and fuzzy mathematics theories to comprehensively assess engagement levels. The applicability and robustness of the proposed framework were demonstrated through a case study involving four university instructors from a higher education institution in Tianjin. The results revealed that the fuzzy-grey correlation approach effectively distinguished varying levels of engagement among the sampled instructors, offering a more nuanced and data-driven foundation for engagement-based performance evaluations. This methodological framework provides a practical tool for decision-makers and education administrators aiming to implement equitable and evidence-based faculty management strategies.

Keywords: Engagement; College teacher; Fuzzy entropy weight; Fuzzy-grey correlation evaluation

1. Introduction

As the first resource of the college, teachers are the most valuable, reliable and competitive core elements for achieving college strategy and upgrading education level. With the increasingly diversified and complicated employment relationship between colleges and teachers, teachers' working status is becoming more and more important to colleges. College teachers' engagement is not only related to the talent cultivation of college students and the realization of teachers' self-worth but also the decisive factor for the success of college education. The scientific evaluation of college teachers' engagement is of great practical significance for improving the performance of teachers and promoting the healthy development of colleges and universities.

Great progress has been made both at home and abroad in the profound research on evaluation of engagement. For example, Schaufeli et al. (2002) developed a self-report questionnaire, i.e., the Utrecht Work Engagement Scale, which has become the most widely used measurement tool in relevant empirical research. Schaufeli et al. (2006) also developed a short nine-item version of the Utrecht Work Engagement Scale and provided evidence for its cross-national validity. May et al. (2004) prepared an engagement scale consisting of 13 measurement items, including three aspects of physical engagement, emotional engagement, and cognitive engagement. Saks (2006) developed a 6-item scale to measure job engagement. Rothbard (2001) distinguished two separate but related components of engagement, i.e., attention and absorption, and developed a 9-item scale. Soane et al. (2012) developed a 9-item scale that includes three items to assess intellectual engagement, affective engagement, and social engagement, respectively. Stumpf et al. (2013) developed a two-dimensional measure of engagement, including behavioral engagement and felt engagement. In China, Xiao & Duan (2014) developed a 16-item measurement scale for employee engagement in state-owned enterprises. Yin (2011) established an employee engagement evaluation indicator system from two dimensions of employee's mentality and behavior and built an employee engagement evaluation model based on fuzzy analytic hierarchy process. Yang & Luo (2014) constructed an engagement evaluation model by introducing the multi-level extension evaluation method. These models have primarily been derived from Kahn's foundational definition of employee commitment (Kahn, 1990), and their methodologies have predominantly relied on self-evaluation by the subjects of research. The use of third-party or peer evaluations—referred to as others-rating—has remained relatively underexplored. In addition, these studies seldom consider the fuzziness and greyness of evaluation indicators, which may lead to differences between the evaluation results and actual conditions.

Based on the fuzzy and grey theories, the fuzzy-grey correlation evaluation, which considers the fuzziness and greyness of the factors, could be used to evaluate the complicated problems more objectively and obtain more accurate evaluation results. Fuzzy-grey correlation evaluation has been further developed and applied in many areas, such as the ranking of the advanced manufacturing systems (Goyal & Grover, 2012), the multi-criteria analysis of maintenance performance systems (Ighravwe & Oke, 2017), the framework for construction-related risks (Jalhoom & Mahjoob, 2024), portfolio optimization (Mehlawat et al. 2022), the appraisement and benchmarking of supply chain performance (Sahu et al., 2015), software effort estimation (Azzeh et al., 2010), multi-criteria decision-making (MCDM) problems (Liao et al., 2013), wastewater treatment process selection (Karimi et al., 2018), and the evaluation of enterprise financial risk (Lin & Shang, 2025). However, the application of fuzzy-grey correlation evaluation in the field of education, especially in terms of teachers' engagement, is still limited at present.

Combined with the characteristics of college teachers and the results of interviews with experts and teachers, the evaluation indicator system of college teachers' engagement was proposed in this study. According to the fuzziness and greyness of the evaluation indicator system, the fuzzy-grey correlation evaluation method based on the combination of the triangular fuzzy number and the grey correlation analysis was used to evaluate college teachers' engagement. This study is expected to provide references for the improvement of college teachers' engagement in Chinese higher education.

2. Evaluation Indicator System of College Teachers' Engagement

As mentioned above, no matter in academia or management practice, the evaluation of engagement has predominantly relied on self-evaluation by the individuals being assessed, and others-rating has remained relatively underexplored. For academic research, the way of self-evaluation may not have a significant impact on the evaluation results, since most of them adopt anonymous investigation and do not involve the direct benefit of the research object. However, in the management practice, employees may avoid answering some questions if the way of self-evaluation is used to obtain their engagement, leading to questionable accuracy and objectivity of evaluation results. In order to ensure the objectivity of the evaluation results, this study intends to construct an evaluation indicator system of college teachers' engagement from the perspective of others-rating.

Table 1. Evaluation indicator system of college teachers' engagement

First-Level Evaluation Indicator	Second-Level Evaluation Indicator
Cognitive engagement U_1	Sense of work value U_{11}
	Working fulfillment U_{12}
	Working responsibility U_{13}
	Sense of work honor U_{14}
Emotional engagement U_2	Vigor U_{21}
	Optimism U_{22}
	Dedication U_{23}
	Positive persistence U_{24}
	Loyalty to the organization U_{25}
	Identification with organization U_{26}
Behavioral engagement U_3	Task focus U_{31}
	Positive suggestions U_{32}
	Willing to share knowledge and experience U_{33}
	Compliance with the working system and discipline U_{34}
	Active learning U_{35}
	High working efficiency U_{36}
	Working overtime U_{37}

Rich et al. (2010) believe that the external manifestation of engagement is reflected in three aspects: cognitive focus, emotional involvement and behavioral effort. College teachers' engagement is a measure of their cognition, identification, and commitment to work. This engagement is shaped by teachers' cognitive interpretations, affective responses, and behavioral interactions with their work and the institutional environment. Based on Rich's point of view, referring to Gallup's Q12 questionnaire (Gallup, 2024) and the Hewitt employee engagement questionnaire (Stephanie & Gustomo, 2015), combined with the results of interviews with some research experts, human resources managers and teachers in colleges, the evaluation indicator system of college teachers' engagement, which includes three first-level evaluation indicators and 17 second-level evaluation indicators, was proposed by using the stepwise hierarchical method from the three aspects of cognition, behavior and emotion. The evaluation indicator system is presented in Table 1.

3. Fuzzy-Grey Correlation Evaluation Method of College Teachers' Engagement

Evaluation of college teachers' engagement is a typical problem of the fuzzy-grey system, and the fuzzy-grey correlation evaluation based on grey and fuzzy mathematics theories can deal with both fuzziness and greyness of the evaluation factors.

3.1 Determining the Evaluation Program, Factor and Expert Sets

According to the existing evaluation indicator system of college teachers' engagement, the evaluation factor set was established. Suppose $\mathrm{A}=\{A_1,A_2,\cdots,A_n\}$ is the program set, $\mathrm{U}=\{U_1,U_2,\cdots,U_m\}$ is the factor set which consists of the first-level evaluation indicators, $U_i=\left\{U_{i1},U_{i2},\cdots,U_{ib_i}\right\}$ $(i=1,2,\cdots,m)$ is the factor set that consists of the corresponding second-level indicators, b_i is the number of the corresponding second-level evaluation indicators, $\mathrm{S}=\{S_1,S_2,\cdots,S_h\}$ is the evaluation expert set, and h is the number of experts.

3.2 Construction of the Evaluation Matrix

To assess the qualitative second-level evaluation indicators U_{ij} under n programs, linguistic variables were assigned by h experts. These linguistic variables were subsequently converted into corresponding triangular fuzzy numbers, as defined in Table 2, following the transformation relationships presented by Li et al. (2024).

The average triangular fuzzy numbers of the qualitative indicators, given by h evaluation experts, were calculated. Then the numbers were taken as the indicators' values. The value of program A_k of the second-level evaluation indicator U_{ij} is the triangular fuzzy number $\tilde{a}_{kj}^{(i)}=\left(l_{kj}^{(i)},m_{kj}^{(i)},u_{kj}^{(i)}\right)$ $(k=1,2,\cdots,n;j=1,2,\cdots,b_i)$, and the second-level evaluation matrix corresponding to the first-level evaluation indicator U_i can be obtained by the formula $\tilde{A}^{(i)}=\left(\tilde{a}_{kj}^{(i)}\right)_{n\times b_i}$.

Table 2. Transformation between linguistic variables and triangular fuzzy numbers

Linguistic Variable	Triangular Fuzzy Number
Very good (VG)	(0.75, 1, 1)
Good (G)	(0.5, 0.75 ,1)
Fair (F)	(0.25, 0.5, 0.75)
Poor (P)	(0, 0.25, 0.5)
Very poor (VP)	(0, 0, 0.25)

3.3 Normalization of Indicator Value

Let

$$l_j^{(i)max}=max\left\{l_{kj}^{(i)}\mid l_{kj}^{(i)}\in\tilde{a}_{kj}^{(i)}\right\}$$
$$l_j^{(i)min}=min\left\{l_{kj}^{(i)}\mid l_{kj}^{(i)}\in\tilde{a}_{kj}^{(i)}\right\}$$

Similarly, $m_j^{(i)max}$, $m_j^{(i)min}$, $u_j^{(i)max}$, and $u_j^{(i)min}$ can be obtained. The normalized fuzzy indicator values $\tilde{r}_{kj}^{(i)}$ in the benefit and cost types are as follows. Eq. (1) is used for the benefit types; Eq. (2) is used for the cost types.

$$\tilde{r}_{kj}^{(i)} = \left(\frac{l_{kj}^{(i)}}{u_j^{(i)\max}}, \frac{m_{kj}^{(i)}}{m_j^{(i)\max}}, \frac{u_{kj}^{(i)}}{l_j^{(i)\max}} \wedge 1 \right) \tag{1}$$

$$\tilde{r}_{kj}^{(i)} = \left(\frac{l_j^{(i)} min}{u_{kj}^{(i)}}, \frac{m_j^{(i)min}}{m_{kj}^{(i)}}, \frac{u_j^{(i)min}}{l_{kj}^{(i)}} \wedge 1 \right) \tag{2}$$

According to this method, the second-level evaluation matrix $\tilde{A}^{(i)} = \left(\tilde{a}_{kj}^{(i)}\right)_{n\times b_i}$ was normalized to $\tilde{R}^{(i)} = \left(\tilde{r}_{kj}^{(i)}\right)_{n\times b_i}$, where $\tilde{r}_{kj}^{(i)} = \left(l_{kj}^{(i)'}, m_{kj}^{(i)'}, u_{kj}^{(i)'}\right)$.

3.4 Determining the Ideal Program

The standardized matrix $\tilde{R}^{(i)} = \left(\tilde{r}_{kj}^{(i)}\right)_{n\times b_i}$ seeks the ideal solution $\tilde{r}^{(i)^*} = \left(\tilde{r}_1^{(i)^*}, \tilde{r}_2^{(i)^*}, \cdots, \tilde{r}_{b_i}^{(i)^*}\right)$, where $\tilde{r}_j^{(i)^*} = \left(\max\limits_k\left\{l_{kj}^{(i)'}\right\}, \max\limits_k\left\{m_{kj}^{(i)'}\right\}, \max\limits_k\left\{u_{kj}^{(i)'}\right\}\right)$.

3.5 Calculation of the Fuzzy-Grey Correlation Coefficient

Using the distance formula of the triangular fuzzy number (Chen, 2000), the distance of each program to the ideal solution on each second-level evaluation indicator U_{ij} can be calculated respectively, and the distance matrix $D^{(i)} = \left(d_{kj}^{(i)}\right)_{n\times b_i}$ also can be obtained by Eq. (3).

$$d_{kj}^{(i)} = \sqrt{\left[\left(l_{kj}^{(i)'} - \max_k\left\{l_{kj}^{(i)'}\right\}\right)^2 + \left(m_{kj}^{(i)'} - \max_k\left\{m_{kj}^{(i)'}\right\}\right)^2 + \left(u_{kj}^{(i)'} - \max_k\left\{u_{kj}^{(i)}\right\}\right)^2\right]/3} \tag{3}$$

According to grey correlation theory, the fuzzy-grey correlation coefficient $\xi_{kj}^{(i)}$ of program A_k and the ideal solution in the second-level evaluation indicator U_{ij} can be computed, and the fuzzy-grey correlation coefficient matrix $\zeta^{(\mathrm{i})} = \left(\xi_{kj}^{(i)}\right)_{n\times b_i}$ can also be obtained by Eq. (4).

$$\xi_{kj}^{(i)} = \frac{\min_k \min_j \left\{d_{kj}^{(i)}\right\} + \lambda \max_k \max_j \left\{d_{kj}^{(i)}\right\}}{d_{kj}^{(i)} + \lambda \max_k \max_j \left\{d_{kj}^{(i)}\right\}} \tag{4}$$

where, λ is the distinguishing coefficient, and λ = 0.5 in general.

3.6 Calculation of the Fuzzy-Grey Correlation

Let $\left(\omega_{i1}, \omega_{i2}, \cdots, \omega_{ib_i}\right)$ be the weight vector corresponding to the factor set $U_{i=}\left\{U_{i1}, U_{i2}, \cdots, U_{ib_i}\right\}$, the fuzzy-grey correlation between program A_k and the ideal program in the first-level evaluation indicator U_i can be obtained by Eq. (5).

$$\gamma_k^{(i)} = 1 - \sqrt{\sum_{j=1}^{b_i} \omega_{ij}\left(1 - \xi_{kj}^{(i)}\right)^2} \tag{5}$$

3.7 Comprehensive Evaluation Results of the Fuzzy-Grey Correlation

$$\gamma = \begin{bmatrix} \gamma_1^{(1)} & \gamma_1^{(2)} & \cdots & \gamma_1^{(m)} \\ \gamma_2^{(1)} & \gamma_2^{(2)} & \cdots & \gamma_2^{(m)} \\ \vdots & \vdots & \ddots & \vdots \\ \gamma_n^{(1)} & \gamma_n^{(2)} & \cdots & \gamma_n^{(m)} \end{bmatrix}$$

Let $\omega = (\omega_1, \omega_2, \cdots, \omega_m)$ be the indicator weight vector corresponding to the factor set $U = \{U_1, U_2, \cdots, U_m\}$ which consists of the first-level evaluation indicators, then the final results of the comprehensive fuzzy-grey correlation evaluation can be calculated by Eq. (6).

$$R = \gamma \times \omega = (R_1, R_2, \cdots, R_n) \tag{6}$$

According to the fuzzy-grey correlation R_k of each program, the programs can be sorted. The greater the fuzzy-grey correlation, the better the program is.

4. Fuzzy Entropy Weight Method

There are two kinds of methods for determining the evaluation indicator weight, namely, the subjective and objective weighting methods (Nik Zahari & Abdullah, 2012). Among them, the fuzzy entropy weight method is a kind of objective weighting method. Entropy is a measure of the uncertainty of the system and can be used to reflect valid information in the data (Dehghan & Ghassemian, 2006). The fuzzy entropy weight method can eliminate the subjective factors when determining the indicator weight in order to obtain more objective evaluation results. Therefore, this method can be used to determine the evaluation indicator weight of college teachers' engagement. The specific steps are as follows:

Let p and q denote the numbers of evaluation indicators and objects, respectively; then the fuzzy evaluation indicator value matrix is as follows:

$$\tilde{x} = \begin{bmatrix} \tilde{x}_{11} & \tilde{x}_{12} & \cdots & \tilde{x}_{1q} \\ \tilde{x}_{21} & \tilde{x}_{22} & \cdots & \tilde{x}_{2q} \\ \vdots & \vdots & \ddots & \vdots \\ \tilde{x}_{p1} & \tilde{x}_{p2} & \cdots & \tilde{x}_{pq} \end{bmatrix}_{p\times q}$$

where, $\tilde{x}_{ab}$ is the triangular fuzzy number, with $\tilde{x}_{ab} = (l_{ab}, m_{ab}, u_{ab})$ $(a = 1,2,\cdots,p; b = 1,2,\cdots q)$.

The membership function of the triangular fuzzy number was used to calculate the expected value of the fuzzy evaluation indicator value $\tilde{x}_{ab}$. The fuzzy evaluation indicator value matrix can be converted into the evaluation indicator value matrix $\mathrm{X} = [I(\tilde{x}_{ab})]_{p\times q}$ by Eq. (7).

$$I(\tilde{x}_{ab}) = (l_{ab} + 2m_{ab} + u_{ab})/4 \tag{7}$$

For $a = 1,2,\cdots,p$, the fuzzy entropy of the a-th evaluation indicator can be obtained by Eq. (8).

$$y_a = -c\sum_{b=1}^{q} z_{ab}\, ln\, z_{ab} \tag{8}$$

where, $\mathrm{c} = \frac{1}{\ln q}$, $z_{ab} = \frac{I(\tilde{x}_{ab})}{\sum_{b=1}^{q} I(\tilde{x}_{ab})}$, and $z_{ab}\ln z_{ab} = 0$ when $z_{ab} = 0$.

The fuzzy entropy weight of the a-th evaluation indicator can be obtained by Eq. (9).

$$\omega_a = \frac{1 - y_a}{p - \sum_{a=1}^{p} y_a} \tag{9}$$

5. Example Analyses

Taking four teachers from a college in Tianjin as an example, the fuzzy entropy weight method and the fuzzy-grey correlation evaluation method were used to evaluate the college teachers' engagement. The evaluation information given by four experts is shown in Table 3, Table 4, Table 5, Table 6, respectively.

Table 3. Evaluation information given by the first expert

Second-Level Evaluation Indicator	Teacher A	Teacher B	Teacher C	Teacher D
U_{11}	G	G	G	G
U_{12}	VG	G	G	G
U_{13}	G	G	G	VG
U_{14}	VG	F	G	G
U_{21}	VG	P	G	VG
U_{22}	VG	F	VG	G
U_{23}	G	F	G	G
U_{24}	VG	G	G	G
U_{25}	G	F	F	G
U_{26}	G	F	G	G
U_{31}	VG	F	G	G
U_{32}	G	F	G	VG
U_{33}	VG	G	G	G
U_{34}	F	F	VG	G
U_{35}	G	F	F	G
U_{36}	VG	F	F	G
U_{37}	F	P	G	G

Table 4. Evaluation information given by the second expert

Second-Level Evaluation Indicator	Teacher A	Teacher B	Teacher C	Teacher D
U_{11}	G	F	G	F
U_{12}	G	F	G	G
U_{13}	G	F	G	G
U_{14}	F	G	F	F
U_{21}	G	F	G	G
U_{22}	VG	P	G	VG
U_{23}	G	F	G	G
U_{24}	VG	F	VG	G
U_{25}	G	F	G	G
U_{26}	G	F	F	F
U_{31}	VG	P	G	F
U_{32}	VG	F	G	G
U_{33}	VG	VP	F	G
U_{34}	VG	F	G	VG
U_{35}	G	P	F	VG
U_{36}	F	P	F	G
U_{37}	G	F	F	F

5.1 Determining the Indicator Weight

Taking the weight determination process of the second-level evaluation indicator corresponding to cognitive engagement as an example, according to Eq. (7), the fuzzy evaluation indicator value matrix was converted into the evaluation indicator value matrix X.

$$X = \begin{bmatrix} 0.797 & 0.688 & 0.688 & 0.688 \\ 0.844 & 0.563 & 0.750 & 0.844 \\ 0.750 & 0.563 & 0.797 & 0.734 \\ 0.781 & 0.500 & 0.625 & 0.563 \end{bmatrix}$$

According to Eqs. (8) and (9), the weight vector of the second-level evaluation indicator corresponding to cognitive engagement was obtained, which is $(0.059, 0.337, 0.222, 0.383)$. Similarly, the weights of other second-level evaluation indicators and the first-level evaluation indicators were obtained. The evaluation indicator weights of college teachers' engagement are shown in Table 7.

Table 5. Evaluation information given by the third expert

Second-Level Evaluation Indicator	**Teacher A**	**Teacher B**	**Teacher C**	**Teacher D**
U_{11}	VG	G	G	G
U_{12}	G	F	G	VG
U_{13}	G	F	G	G
U_{14}	VG	F	G	F
U_{21}	VG	F	VG	G
U_{22}	G	F	VG	G
U_{23}	G	G	G	VG
U_{24}	G	F	VG	VG
U_{25}	G	G	G	VG
U_{26}	VG	F	F	G
U_{31}	VG	F	G	G
U_{32}	G	G	G	G
U_{33}	VG	F	VG	G
U_{34}	F	F	VG	VG
U_{35}	G	F	G	F
U_{36}	F	F	G	G
U_{37}	G	F	G	VG

Table 6. Evaluation information given by the fourth expert

Second-Level Evaluation Indicator	**Teacher A**	**Teacher B**	**Teacher C**	**Teacher D**
U_{11}	G	G	F	G
U_{12}	VG	F	G	VG
U_{13}	G	F	VG	F
U_{14}	G	F	F	F
U_{21}	VG	P	G	G
U_{22}	VG	F	G	VG
U_{23}	VG	F	G	G
U_{24}	G	VG	G	VG
U_{25}	G	F	G	G
U_{26}	G	F	G	F
U_{31}	VG	F	G	VG
U_{32}	VG	F	G	G
U_{33}	G	G	G	G
U_{34}	VG	G	G	G
U_{35}	G	F	F	VG
U_{36}	VG	F	G	F
U_{37}	G	F	G	G

5.2 Calculation Process of the Fuzzy-Grey Correlation Evaluation

Taking the second-level evaluation indicator corresponding to cognitive engagement as an example, the exact indicator value is represented by the triangular fuzzy number, and the standardized second-level evaluation matrix was obtained.

$$\tilde{A}^{(1)} = \begin{bmatrix} (0.6,1,1) & (0.65,1,1) & (0.5,0.882,1) & (0.579,1,1) \\ (0.4,0.765,1) & (0.3,0.611,1) & (0.35,0.706,1) & (0.263,0.625,1) \\ (0.45,0.824,1) & (0.55,0.889,1) & (0.6,1,1) & (0.421,0.813,1) \\ (0.4,0.765,1) & (0.6,0.944,1) & (0.55,0.941,1) & (0.316,0.688,1) \end{bmatrix}$$

Using Eqs. (3) and (4), the fuzzy-grey correlation coefficient matrix was constructed.

$$\zeta^{(1)}=\begin{bmatrix}1 & 1 & 0.629 & 1\\ 0.459 & 0.333 & 0.404 & 0.348\\ 0.530 & 0.636 & 1 & 0.516\\ 0.459 & 0.778 & 0.772 & 0.390\end{bmatrix}$$

According to Eq. (5), the fuzzy-grey correlation vector corresponding to cognitive engagement is (0.825,0.361,0.617,0.567). Similarly, the fuzzy-grey correlation vectors of the first-level indicators were obtained, which constitute the following fuzzy-grey correlation degree matrix:

$$\gamma=\begin{bmatrix}0.825 & 0.913 & 0.840\\ 0.361 & 0.372 & 0.412\\ 0.617 & 0.653 & 0.630\\ 0.567 & 0.701 & 0.717\end{bmatrix}$$

Eq. (6) was used to calculate the fuzzy-grey correlation of four teachers' engagement, i.e., $R_1=0.874$, $R_2=0.384$, $R_3=0.639$, and $R_4=0.685$. The ranking of the engagement level of four teachers is $A_1>A_4>A_3>A_2$, that is, teacher A is best, followed by teacher D. The evaluation results are consistent with the daily performance and work performance of four teachers. Therefore, the fuzzy-grey correlation evaluation method can achieve effective ranking of college teachers' engagement.

Table 7. Evaluation indicator weights of college teachers' engagement

First-Level Evaluation Indicator	Weight	Second-Level Evaluation Indicator	Weight
U_1	0.163	U_{11}	0.059
		U_{12}	0.337
		U_{13}	0.222
		U_{14}	0.382
U_2	0.495	U_{21}	0.392
		U_{22}	0.294
		U_{23}	0.082
		U_{24}	0.040
		U_{25}	0.072
		U_{26}	0.120
U_3	0.342	U_{31}	0.248
		U_{32}	0.082
		U_{33}	0.133
		U_{34}	0.094
		U_{35}	0.189
		U_{36}	0.124
		U_{37}	0.130

6. Conclusions

By using the fuzzy entropy weight method to eliminate the subjective factors, the evaluation indicator weight of college teachers' engagement is more objective. Taking four teachers from a college in Tianjin as an example, the fuzzy-grey correlation evaluation method was used to evaluate the college teachers' engagement. The research shows that the evaluation results are consistent with the daily performance and work performance of four teachers. Therefore, this method can effectively rank and evaluate college teachers' engagement in Chinese higher education. These methods could be adopted by colleges in the future to assess teachers' work status and establish an early warning mechanism for teacher commitment. For teachers with lower-level commitment, measures such as counseling sessions, training programs, or reassigning positions could be implemented to enhance their work commitment and promote the high-quality development of the faculty.

Data Availability

The data used to support the research findings are available from the corresponding author upon request.

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Conflicts of Interest

The authors declare no conflict of interest.

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