

Construction of an Internet Teaching Management Model Based on a Comprehensive Evaluation Model

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Abstract. Under the background of "Internet+", the traditional education management mode has been unable to meet the needs of the current development of colleges and universities, and Internet technology should be applied to the education management work of colleges and universities to realize the personalized development of students, so as to promote the enhancement of the quality of education management work of colleges and universities. Based on the characteristics of the Internet teaching management mode, this paper constructs the evaluation system of Internet teaching effect management, and utilizes the linear planning model to combine the G1 method of subjective weighting and the CRITIC method of objective empowerment to assign values to the evaluation indexes. Subsequently, taking the seven colleges and universities in S city as an example, the TOPSIS comprehensive evaluation model is used to calculate their effects. The relative closeness of F school is 0.622, and it has achieved the best results in Internet teaching organization management (0.825) and Internet teaching quality management (0.995), but it needs to continue to improve in the management of the teaching process and the management of the success of teaching. Relying on the construction of the "Internet + education" platform, innovative teaching management methods, improve the efficiency and quality of teaching management, and promote the high-quality development of colleges and universities.

1. Introduction

Teaching management is an important task in colleges and universities, and the quality of its management will be related to the whole college and university teaching level [1]. However, through the understanding can be found, in the current scope of teaching management work, because of the formation of colleges and universities management ideas and construction of management system is relatively backward, resulting in the final management effect is not ideal [2]. First of all, in the face of this work, still continue the traditional manual management concept, emphasizing the management personnel to carry out mechanical and stereotyped management work. Such a management mode not only has great limitations in time and space, but also creates a great deal of pressure and burden on the managers, which seriously affects

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the effectiveness of the whole management work [3, 4]. Secondly, the construction of management system is not novel enough. Failure to introduce more advanced management technology and implementation means, resulting in the existing management system internal composition structure is relatively one-sided, the function module setting is not standardized, which seriously affects the management implementation effect [5, 6]. At the same time, there is also a great deficiency in the quality construction of managers. Failure to effectively follow the development trend of the new period of reform, the introduction of high-quality management personnel, resulting in the management of all management work because of the limitations of the quality of personnel and difficult to carry out smoothly, which seriously impedes the progress of teaching management, and even affect the overall quality of management [7].

With the continuous implementation of the concept of "Internet+", many derivative concepts such as "Internet + government affairs", "Internet + medical care", and "Internet + education" have gradually emerged [8]. Among them, the development of China's "Internet + education" has entered the development period from the embryonic stage, and is realizing the deep integration of education and technology, promoting the healthy development of education. The Internet is the main situation of social development in the new period, in the current era, gradually derived from many advanced technical means, showing a strong intelligent characteristics, to promote the effective reform of teaching and management work in colleges and universities has an important impact [9].

In the current era, the development trend of the Internet is particularly significant, and brings new opportunities for the development of teaching management in colleges and universities. It is necessary to effectively adapt to the background of this era and explore more effective management mode to improve the overall quality of teaching [10]. Literature [11] describes that teaching management is the basis for the normal operation of teaching, and at the same time, it significantly affects the professional development and growth of teachers, and is closely related to education reform, and explores the problems existing in the current education management, such as a single form of teaching, insufficient teaching interaction, etc., and proposes to optimize the teaching work by adopting the Internet personalized recommendation technology. Literature [12] explored Indian teachers' attitudes towards online teaching management, including online teaching experience and optimization suggestions, which are important references for both online teaching and online teaching management. Literature [13] conceived an automation model of physical education teaching management based on Internet of Things (IoT) technology, which effectively optimizes the management of physical education teaching resources and improves the operational efficiency of physical education teaching management system. Literature [14] attempted to introduce Internet technology in student education management and confirmed it through teaching practice, pointing out that the construction of education management informatization and intelligence is conducive to the enhancement of the effect of student education, and also improves the efficiency and quality of talent cultivation. Literature [15] combines comprehensive analysis theory as well as empirical research methods to explore the performance of the teaching management system ILIAS, and finds that this educational management system promotes the cultivation of teachers' professional ability, and can effectively assist teachers in making scientific and reasonable teaching management decisions. Literature [16] examined the performance of the Internet technology as the core logic education management information system in college physical education teaching, pointed out that the teaching management system improves the teachers' ability to control students' physical education learning, and assists the teachers to make the teaching plan, teaching feedback and optimization of teaching strategies, which to a certain extent enhances the effectiveness of physical education teaching and is conducive to the professional development of physical education teachers.

Starting from the characteristics of the education management mode under Internet + education, this paper constructs the evaluation index system of Internet teaching management from four aspects, namely, teaching organization management, teaching process management, teaching quality management and teaching achievement management, based on the principles of objectivity, orientation, wholeness, independence and operability. Considering that the evaluation indicators of the effect of Internet teaching management are not completely independent, and the traditional indicator determination method is not comprehensive enough, the study adopts the G1 method to calculate the subjective weight of each risk evaluation indicator, adopts the improved CRITIC method to calculate the objective weight of each risk evaluation indicator, and further utilizes the linear programming model to comprehensively calculate the

combination weight of the evaluation indicators of the Internet teaching management to reduce the subjective arbitrariness, to improve the objectivity of the evaluation index weights, so that the evaluation results are more in line with reality. The TOPSIS model is then introduced to establish an evaluation model of Internet+ education management, and the Internet teaching management effects of seven universities are evaluated with S city as an example, so as to explore the innovative way of Internet teaching management mode.

2. The Effectiveness of Internet+ Teaching Management Based on Comprehensive Evaluation Models

2.1. Internet Instructional Management Evaluation System

2.1.1. Education Management under "Internet + Education"

On the network platform, education and teaching should be based on the overall situation of the school curriculum teaching, adopt the "Internet + education" new mode, through the mobile terminal and network management of teaching, accurate provision of resources and information in the field of education and teaching, dredge the education and teaching pathway to achieve the Internet of Things as a platform for the teaching of professional courses from the previous "teaching"-oriented gradually changed to "learning"-oriented, learning mode from traditional passive learning gradually changed to active learning, a comprehensive understanding of the teaching needs of teachers and students, and further enhance the level of education. The Internet-based curriculum education management system includes three parts: preparation of teaching resources, teaching process, and teaching evaluation system.

2.1.2. Principles for the Selection of Evaluation Indicators

The teaching process is a very complex process, not only the cycle is long, but also involves a wide range of aspects, the quality of teaching management, not only depends on the student base, the level of teachers, teaching facilities, teaching environment, and also with the school leadership, management and services at all levels. Thus, to make a scientific and comprehensive evaluation of the quality of teaching management, it is necessary to establish a set of effective index system.

There are many factors affecting the quality of teaching management, which makes the selection of indicators difficult, how to carry out the selection of indicators, can follow the following principles.

1. **The principle of objectivity.** The establishment of teaching management quality evaluation index system must follow the laws of higher education, must be consistent with the actual teaching process, each specific indicator has to reflect the teaching situation. The objectivity of teaching management quality evaluation index is the prerequisite for the evaluation results to be true, scientific or not.
2. **Orientation principle.** The purpose of teaching management quality evaluation is to ensure and improve the effectiveness of teaching management. Therefore, the scientific evaluation index system of teaching management effect can guide the teaching behavior of teachers and students towards standardization, which will inevitably promote the improvement of teaching quality objectively, thus promoting the reform of teaching management.
3. **The principle of wholeness.** Teaching management evaluation index system in the design should not only focus on the definition of key evaluation items and the distribution of weights, but also pay attention to the degree of correlation between the various items of the evaluation indexes, to avoid the phenomenon of focusing only on the local, ignoring the overall situation, and focusing only on the results, ignoring the process.
4. **Principle of independence.** Decomposing the overall goal of the teaching management evaluation index system into a number of specific indicators for evaluation is a necessary means and an effective method to realize the evaluation of teaching management. Therefore, in the overall design of teaching management evaluation indicators, to avoid the emergence of specific indicators that cross and cover each other. Otherwise, the weights of these indicators that cross and cover each other will be increased, while the weights of other indicators will be reduced, thus affecting the evaluation results.

5. **Operational principle.** The expression of teaching management evaluation index must be clear, cannot produce ambiguity, and the evaluation of each specific index can be clearly concluded through actual observation and measurement. In terms of specific indicators, there should be a tendency to select quantitative, quantifiable and easily quantifiable indicators.

2.1.3. Establishment of a System of Evaluation Indicators

Combining the whole process of Internet+ teaching management, the teaching management evaluation system is constructed as shown in Table 1. It includes four level 1 indicators of teaching organization management, teaching process management, teaching quality management and teaching achievement management. It is further subdivided into 16 secondary indicators: analysis of teaching materials, analysis of learning situation, teaching environment, teaching media, teaching objectives, teaching introduction, teaching language, teaching script, teaching questions, teaching regulation, student performance, teacher evaluation, student evaluation, post-course counseling, and teaching summaries and teaching reflections.

Table 1: Teaching management and evaluation system

Primary indicator	Secondary indicators	Code
Teaching group management (A1)	Textbook analysis	A11
	Study affective analysis	A12
	Teaching environment	A13
	Teaching media	A14
	Teaching target	A21
Teaching process management (A2)	Teaching import	A22
	Instructional language	A23
	Teaching book	A24
	Teaching question	A25
	Teaching control	A26
Teaching quality management (A3)	Student performance	A31
	Teacher evaluation	A32
	Student evaluation	A33
Teaching summary management (A4)	After-school tutoring	A34
	Teaching summary	A41
	Teaching reflection	A42

2.2. Empowerment of the Indicator System

2.2.1. Determination of Subjective Weights

G1 method is an improved subjective assignment method to make up for the shortcomings of the strong subjectivity of expert scoring in hierarchical analysis method, which can avoid the unreasonable evaluation results due to too many influencing factors [17]. It can eliminate the cumbersome calculation steps, no need for repetitive construction of the matrix, and remove the consistency test, which is easy to apply. The main steps are as follows:

1. *Determine the order relationship.* First of all, the expert needs to select an indicator that is considered the most important among the identified Internet teaching management evaluation indicator set $\{A_1, A_2, \dots, A_n\}$, which is recorded as A_i ; secondly, continue to select the indicator that is considered the most important among the remaining indicators, which is recorded as A_{i-1} . Repeat this process to arrive at the order of importance: $A_i > A_{i-1} > \dots > A_1$, thus determining an ordinal relationship of the degree of importance.

2. *Determine the degree of importance between neighboring indicators.* Let the ratio of importance between neighboring indicators A_{k-1} and A_k be r_k , then:

$$r_k = \frac{A_{k-1}}{A_k} \quad (k = n, n-1, n-2, \dots, 3, 2) \quad (1)$$

where A_k represents the weight of the k -th indicator. When the number of indicators n is large, the least important indicator can be taken as $n = 1$.

3. *Calculation of weight coefficients.* First of all, the corresponding weights of the five first-level indicators in the Internet teaching management evaluation system are calculated, and by the same token, the weights of each second-level indicator under the five first-level indicators are calculated. For example, if rational assignments r_k are given, then the weight of the n -th indicator is:

$$A_n = \left[1 + \sum_{i=2}^n \prod_{i=k}^n r_i \right]^{-1} \quad (2)$$

4. *Determination of weights.* From weight A_n , the formula for calculating the weight of the $n, n-1, n-2, \dots, 3, 2$ indicator can be derived as:

$$A_{k-1} = A_k \cdot r_k \quad (k = n, n-1, n-2, \dots, 3, 2) \quad (3)$$

5. *Determination of the weights of secondary indicators.* For the determination of the weights of each second-level indicator is the same as the first-level indicator above, and the final second-level weight vector $(A_1^*, A_2^*, \dots, A_n^*)$ is obtained according to the steps from (1) to (4).

2.2.2. Objective Weighting

The paper adopts the improved CRITIC method for objective weight assignment, this method can correlate between indicators and make up for the shortcomings of entropy weight method. The application of the improved CRITIC method replaces the coefficient of variation with the standard deviation to measure the variability within the indicators, and calculates the weights of the indicators, which takes into account both the variability of the indicators and their correlation, and makes the calculation of the weights more reasonable [18]. The specific steps are as follows:

1. *Construct the original judgment matrix.* Let the evaluation object of Internet teaching management be m and the number of evaluation indicators be n , then the evaluation value of the j -th evaluation indicator of the i -rd evaluation object constitutes the evaluation matrix of Internet teaching management $X = [x_{ij}]_{m \times n}$.

2. *Standardized processing of the original evaluation matrix.* The evaluation indicators in the evaluation matrix $X = [x_{ij}]_{q \times n}$ are standardized to obtain the standardized matrix x_{ij}^* :

$$x_{ij}^* = \frac{x_{ij} - \min_i x_{ij}}{\max_i x_{ij} - \min_i x_{ij}} \quad (i = 1, 2, \dots, n; j = 1, 2, \dots, n) \quad (4)$$

Where $\max_i x_{ij}$ and $\min_i x_{ij}$ are the maximum and minimum values of the i -th row of the original matrix X , respectively.

3. *Calculate the standard deviation and correlation coefficient of each index.* as follows:

$$S_i = \sqrt{\frac{1}{m-1} \sum_{j=1}^m (x_{ij} - x_{ij}^*)^2} \quad (i = 1, 2, \dots, m) \quad (5)$$

$$\rho_{ij} = \frac{\text{Cov}(x_i^* - x_j^*)}{(S_i, S_j)} \quad (6)$$

where x_i^* is the mean of the elements of row i , and $\text{Cov}(x_i^* - x_j^*)$ is the covariance between rows i and j of the standardized matrix.

4. Calculate the coefficient of variation of each indicator. v_j :

$$v_j = \frac{S_i}{x_j^*} \quad (j = 1, 2, \dots, n) \quad (7)$$

where x_j^* is the mean value of the j -th indicator in the normalization matrix.

5. Calculate the independence coefficient.

$$n_j = \sum_{k=1}^n 1 - \rho_{ij} \quad (j = 1, 2, \dots, n) \quad (8)$$

6. Calculate the composite coefficient.

$$C_j = v_j \sum_{i=1}^n (1 - \rho_{ij}) \quad (j = 1, 2, \dots, n) \quad (9)$$

7. Calculation of indicator weights.

$$\omega_j = \frac{C_j}{\sum_{j=1}^n C_j} \quad (10)$$

2.2.3. Determination of Portfolio Weights

Remember that the weight vector obtained by the G1 method is $\omega_1 = (\omega_{11}, \omega_{12}, \omega_{13}, \dots, \omega_{1n})^T$, the weight vector obtained by the improved CRITIC method is $\omega_2 = (\omega_{21}, \omega_{22}, \omega_{23}, \dots, \omega_{2n})^T$, and the combination weight is $\omega_c = (\omega_{c1}, \omega_{c2}, \omega_{c3}, \dots, \omega_{cn})^T$. In order to ensure the scientific nature of the combination weight, so that the deviation between the subjective and objective weights is as small as possible.

Set the ideal value of each index attribute as a_j ($j = 1, 2, \dots, n$), then the ideal program $D = (\omega_{c1}a_1, \omega_{c2}a_2, \dots, \omega_{cn}a_n)$, the distance from each program to the ideal program is d_i , the smaller d_i , the closer to the ideal program. The weight of each indicator is unitized with the following formula:

$$d_j = \left\{ \sum_{k=2}^n [(a_{ij} - a_j)\omega_{c1}]^2 \right\}^{\frac{1}{2}} \quad (11)$$

$$\omega_1^* = \frac{\omega_1}{\omega_{11}^2 + \omega_{12}^2 + \dots + \omega_{1n}^2} \quad (12)$$

$$\omega_2^* = \frac{\omega_2}{\omega_{21}^2 + \omega_{22}^2 + \dots + \omega_{2n}^2} \quad (13)$$

$$\omega_3^* = \frac{\omega_3}{\omega_{31}^2 + \omega_{32}^2 + \dots + \omega_{3n}^2} \quad (14)$$

A nonlinear planning model is established based on the principle of minimizing the distance deviation between weighting schemes, where $\sum_{j=1}^n \omega_{cj}^* = 1$. The Lagrangian function is constructed to derive the formula for portfolio assignment, and after normalization, the final portfolio weights are derived by applying Eqs. (16) and (17).

$$\min F(\omega'_c) = \left[d_{i(\omega'_c)}^2 - d_{i(\omega'_1)}^2 \right]^2 + \left[d_{i(\omega'_c)}^2 - d_{i(\omega'_2)}^2 \right]^2 = \sum_{j=1}^n [(a_{ij} - a_j)(\omega_{cj}^* - \omega_{1j}^*)]^2 + \sum_{j=1}^n [(a_{ij} - a_j)(\omega_{cj}^* - \omega_{2j}^*)]^2 \quad (15)$$

$$\omega_{cj}^* = (\omega_{cj}^* - \omega_{2j}^*)^2 \quad (16)$$

$$\omega_{ij} = \frac{\omega_{cj}^*}{\sum_{j=1}^n \omega_{cj}^*} \quad (17)$$

2.3. Comprehensive Evaluation Model Based on TOPSIS

The basic idea of the TOPSIS method is based on the normalization and normalization of the sample data, to determine the best and worst options for the research objectives, and to analyze the distance between the actual evaluation object and the best and worst options, so as to derive the closeness of each evaluation object to the best option, which can be used to analyze the relative merits and demerits of the individual evaluation objects [19]. The specific steps are as follows:

1. Construct the decision matrix.

$$A = \begin{bmatrix} x_{11} & x_{12} & \cdots & x_{1n} \\ x_{21} & x_{22} & \cdots & x_{2n} \\ \vdots & \vdots & \vdots & \vdots \\ x_{i1} & \cdots & x_{ij} & \cdots \\ \vdots & \vdots & \vdots & \vdots \\ x_{m1} & x_{m2} & \cdots & x_{mn} \end{bmatrix} \quad (18)$$

Where m denotes the number of research objects and n denotes the number of specific indicators.

2. Normalization of indicators. In the determined evaluation index system, most of them are benefit-type indicators, and according to the principle of TOPSIS method, it is necessary to ensure that all of these indicators tend to be normalized. In this paper, we adopt the polar difference standardization method to normalize all the indicators to eliminate the impact of different indicators with different scales, and all the normalized indicators are recorded as x'_{ij} .

3. Construct the normalized weighted decision matrix.

$$Z = A'W = \begin{bmatrix} x'_{11} & x'_{12} & \cdots & x'_{1n} \\ x'_{21} & x'_{22} & \cdots & x'_{2n} \\ \vdots & \vdots & \vdots & \vdots \\ x'_{i1} & \cdots & x'_{ij} & \cdots \\ \vdots & \vdots & \vdots & \vdots \\ x'_{m1} & x'_{m2} & \cdots & x'_{mn} \end{bmatrix} \begin{bmatrix} W_1 & 0 & \cdots & 0 \\ 0 & W_2 & \cdots & 0 \\ \vdots & \vdots & \vdots & \vdots \\ 0 & \cdots & W_j & \cdots \\ \vdots & \vdots & \vdots & \vdots \\ 0 & 0 & \cdots & W_n \end{bmatrix} = (z_{ij})_{m \times n} \quad (19)$$

Where A' is the normalized decision matrix and W_j is the combination weights of the evaluation indicators.

4. Determine the best and worst programs. i.e., positive and negative ideal solutions, in the evaluation objectives. The best program, i.e., the positive ideal solution, is recorded as z_j^+ , then:

$$z_j^+ = (z_1^+, z_2^+, \dots, z_n^+) = (\max\{z_{i1}\}, \max\{z_{i2}\}, \dots, \max\{z_{in}\}) \quad (20)$$

Denote the worst solution, i.e., the negative ideal solution, as z_j^- . Then:

$$z_j^- = (z_1^-, z_2^-, \dots, z_n^-) = (\min\{z_{i1}\}, \min\{z_{i2}\}, \dots, \min\{z_{in}\}) \quad (21)$$

where $i = 1, 2, 3, \dots, m$.

5. Calculate the distance from each evaluation object to the positive and negative ideal points. where $i = 1, 2, 3, \dots, m$. Distance to the positive ideal solution:

$$S_i^+ = \sqrt{\sum_{j=1}^n (z_{ij} - z_j^+)^2} \quad (22)$$

Distance from the negative ideal solution:

$$S_i^- = \sqrt{\sum_{j=1}^n (z_{ij} - z_j^-)^2} \quad (23)$$

6. Calculate the closeness of each evaluation object to the best program.

$$C_i = \frac{S_i^-}{S_i^+ + S_i^-} \quad (24)$$

Obviously, $0 \leq C_i \leq 1$. Finally, the results obtained are synthesized and analyzed, with a greater closeness representing a higher effectiveness of Internet instructional management.

3. Empirical Analysis

3.1. Normalization of Indicators

In order to better verify the feasibility of the above model, it is analyzed and calculated through an example. S urban area is proposed to be in seven colleges and universities (SA~SG), choose to determine one as a demonstration site of Internet + education reform. In the process of selecting and evaluating learning, these seven schools are selected and evaluated through four as well as indicators. The results of the indicator normalization process are shown in Table 2. From the comprehensive view of the four indicators, SF college in the four indicators of the standardized value are more than 0.5, the best comprehensive effect, the preliminary determination of SF school is suitable for the Internet + education reform demonstration site.

Table 2: Index normalization processing results

	SA	SB	SC	SD	SE	SF	SG
Teaching group management (A1)	0.152	0.635	0.443	0.441	0.522	0.631	0.444
Teaching process management (A2)	0.398	0.188	0.512	0.386	0.212	0.538	0.281
Teaching quality management (A3)	0.215	0.183	0.509	0.439	0.495	0.626	0.061
Teaching summary management (A4)	0.242	0.203	0.308	0.557	0.451	0.688	0.268

3.2. Analysis of Weighting Results

3.2.1. Comparative Weighting Analysis

The indicators were assigned from carrying out subjective assignment method, objective assignment method and combination assignment method respectively, and the results of weight comparison analysis are shown in Figure 1.

1. **Subjective weights determined through the G1 method.** There is a large degree of arbitrariness in its value, which is manifested in the excessive weight values of teaching introduction, learning situation analysis, student evaluation, teaching language, and student performance, which are 0.082, 0.086, 0.096, 0.096, and 0.123, respectively, while the weight values of teaching media, and after-school tutoring are too small, which are all no more than 0.02. The disadvantage of the subjective assignment

method is reflected in the fact that the subjective judgment of the evaluator is very important and the calculation results are uncertain. Therefore this weight assignment does not contribute much to the final evaluation result.

2. **Objective weights determined through the CRITIC method.** By analyzing the weights of the indicators determined, it can be seen that each value does not have so much dispersion, and at the same time, the variability and correlation of the indicators are taken into account, so that the hierarchy is clearly defined and the focus is highlighted on the basis of maintaining the objectivity, which overcomes the shortcomings of the subjective assignment method to a certain extent, and it is more objective and accurate in determining the weights.
3. **Finally, looking at the combination of weights,** it can be found that it does not show a large degree of dispersion like subjective weights, and at the same time, it also makes up for the shortcomings of the objective assignment method to a certain extent. The results of the combined weights reflect the advantages of combining subjective and objective weights and improve the reliability of the evaluation results, so the combined weighting method can accurately assign values to the evaluation index system of Internet + education management.

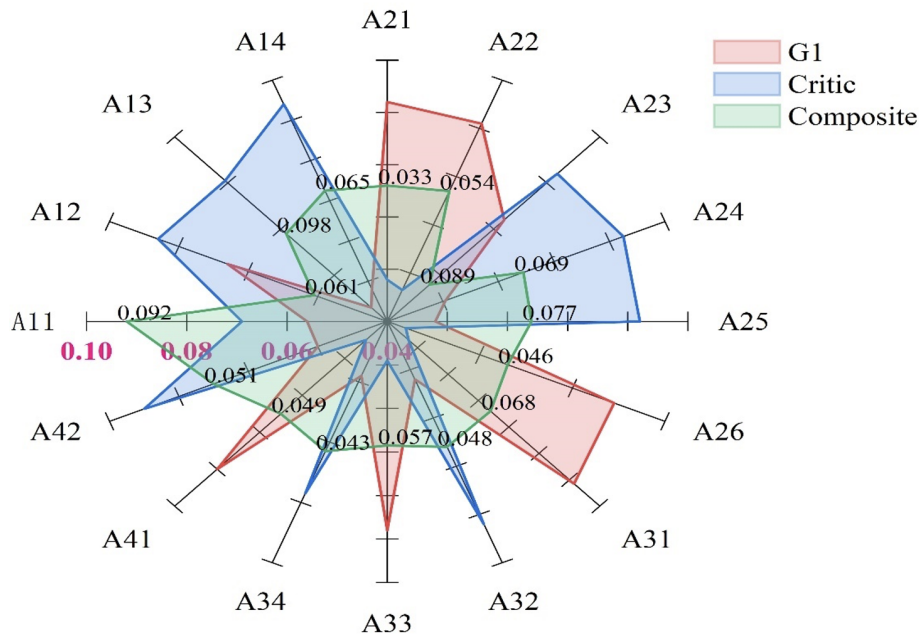


Figure 1: Weight comparison analysis results

3.2.2. Analysis of the Importance of Weights

According to the value of the combination weights in the figure, the following conclusion can be obtained, the average value of the combination weights of the 16 indicators is 0.0625, and there are 7 indicators larger than this average value, which indicates that these indicators have a greater degree of influence on this study. According to the above analysis, since the weight value of these indicators is larger, it means that each expert believes that these indicators have a greater degree of influence on the Internet + teaching management, so these indicators are listed as key indicators, and the analysis of key indicators is shown in Table 3. Through the re-analysis of the above, the following conclusions can be drawn: teaching questions, teaching boards, teaching summaries, student performance has a greater impact on this study, and the results of the order of the degree of influence are: teaching questions (0.098) > teaching boards (0.092) > teaching summaries (0.089) > student performance (0.077) > instructional media (0.069) > instructional

reflections (0.068) > teaching materials analysis (0.065). It indicates that the management of Internet+teaching in colleges and universities should pay special attention to the management of these factors, and it is important to note that the order of management should be in accordance with this ranking of importance.

Table 3: Key indicator analysis

Primary indicator	Secondary indicators	Weight
Teaching group management (A1)	Textbook analysis (A11)	0.065
	Teaching media (A14)	0.069
Teaching process management (A2)	Teaching book (A24)	0.092
	Teaching question (A25)	0.098
Teaching quality management (A3)	Student performance (A31)	0.077
Teaching summary management (A4)	Teaching summary (A41)	0.089
	Teaching reflection (A42)	0.068

3.3. Evaluation Results and Analysis

3.3.1. Analysis of Overall Evaluation Results

Based on Eqs. (22) to (24), the positive and negative ideal solution distances (D^+ , D^-) and relative proximity (C) of seven schools in S city are calculated and ranked. Figure 2 shows the effect of Internet+ education management in seven universities.

As can be seen from the figure, the first place is school F in city S, which is the same as the standardized ranking beforehand, verifying the reasonableness of the evaluation index system constructed and the evaluation method applied in this paper, and its relative proximity is 0.622. School F is following the pace of the times and actively innovating its teaching methods by using informatization technology, so it can be chosen to be a demonstration study. School C in city S is ranked the second, and its relative proximity is 0.559, indicating that it has certain advantages in the fields of teaching organization and management, teaching process management, teaching quality management and teaching results management.

School D and School E in S city ranked third and fourth respectively, with relative closeness of 0.436 and 0.412, which show that the mode of Internet+education management of these two schools has begun to take shape and has already had some effectiveness in teaching and learning management. Schools A, B, and G in S city have relative closenesses of 0.327, 0.301, and 0.231, which ranked fifth to seventh, which show that these three schools' Internet+ education management model is in its infancy, and the combined application of Internet technology and teaching management is not mature enough and still needs further reform.

In order to further explore the development of various fields in S urban colleges and universities, the scores of the seven schools in teaching organization management, teaching process management, teaching quality management and teaching achievement management were calculated by using the combined assignment-TOPSIS evaluation method.

3.3.2. Analysis of Sub-evaluation Results

1. Teaching Organization Management. The teaching organization management scores of the seven schools were calculated and the teaching organization management scores are shown in Table 4. As can be seen, it can be seen that the scores of the seven schools in teaching organization and management vary greatly. School F in S city has a better teaching organization and management and ranks first, with a score of 0.825, while school G needs to be strengthened in teaching organization and management, and ranks last, with a score of 0.025. There are four evaluation indexes of teaching materials analysis, learning situation analysis, teaching environment and teaching media under the level of teaching organization and management, with a small difference in the value of the weight. School G performs slightly worse than the other schools in these four aspects.

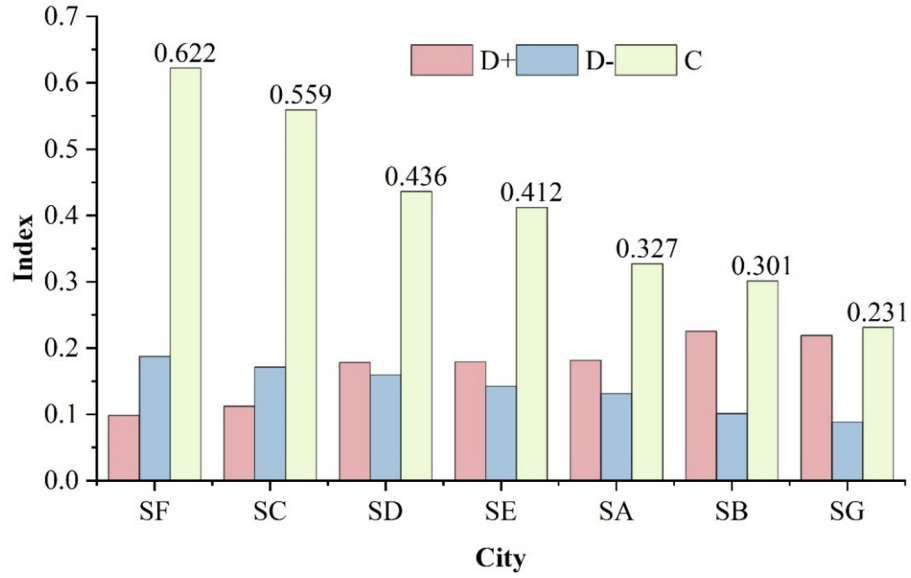


Figure 2: Internet + education management effect

Table 4: Teaching organization and management score

Index	SF	SC	SD	SE	SA	SB	SG
D^+	0.007	0.017	0.099	0.126	0.133	0.174	0.189
D^-	0.179	0.164	0.16	0.149	0.14	0.111	0.071
C	0.825	0.777	0.648	0.529	0.225	0.048	0.025

2. *Teaching Process Management.* The Internet+ teaching process management of the seven schools was calculated and the Internet+ teaching process management scores are shown in Table 5. It can be seen that the Internet+ teaching process management scores of school A, school E and school C are close to each other. School D has a higher level of teaching process management and is in the first place, with a score of 0.492, and school G has an intermediate level of teaching process management and is ranked in the fourth place, with a score of 0.411. There are six evaluation indexes under the level of Internet+ teaching process management, and the order of the size of their weights is in the following order: A23, A25, A24, A26, A22, A21, School D, School A and School E have better performance in the second level indicators.

Table 5: Teaching process and management score

Index	SD	SA	SE	SG	SC	SA	SB
D ⁺	0.051	0.081	0.092	0.14	0.16	0.18	0.195
D ⁻	0.192	0.163	0.121	0.083	0.082	0.041	0.034
C	0.492	0.431	0.425	0.411	0.323	0.311	0.211

3. *Teaching Quality Management.* The teaching quality management scores of the seven schools are calculated, and the teaching quality management scores are shown in Table 6. School F has a high level of Internet+ teaching quality management and is in the first place, with a score of 0.995, which is close to 1.000, and the school effectively utilizes the Internet technology for factual management of the quality of teaching. School G has a low level of teaching quality management and is in the last place, with a score of only 0.008, which is mainly due to the school's underdeveloped educational resources and lack of diversified teaching management methods.

Table 6: Teaching quality management score

Index	SF	SE	SC	SD	SB	SA	SG
D ⁺	0.007	0.017	0.099	0.126	0.133	0.174	0.189
D ⁻	0.179	0.164	0.16	0.149	0.14	0.111	0.071
C	0.995	0.571	0.488	0.213	0.188	0.049	0.008

4. *Management of Teaching Results.* The teaching results management scores of the seven schools were calculated and the teaching results management scores are shown in Table 7. It can be seen that the scores of the seven schools in the management of teaching results vary greatly. With a score of 0.921, school D is in the first place, school D attaches importance to the management of teaching results, and the school carries out in-depth cooperation in textbooks and research through project cooperation and other channels to form a complementary advantage of success in teaching and learning. School G is in the fifth place with a score of 0.345, and the management of teaching results of school G is also slightly insufficient, and there is still a large gap between schools D, F, C, and E.

Table 7: Teaching achievement management score

Index	SD	SF	SC	SE	SG	SA	SB
D ⁺	0.006	0.009	0.017	0.029	0.03	0.043	0.043
D ⁻	0.029	0.019	0.017	0.012	0.009	0.005	0.001
C	0.921	0.503	0.444	0.423	0.345	0.085	0.006

4. Innovative Construction of the Internet Teaching Management Model

Colleges and universities should change their concepts, recognize the situation, make clear the shortcomings of the traditional teaching management mode, reshape the "Internet +" education management ideas, raise the priority of "Internet +" in the teaching management work, and make good use of the "Internet +" to improve teaching management efficiency and change the traditional stereotypes. The use of Internet thinking, the construction of student-oriented education management mechanism, the construction of "Internet +" era of new teacher-student relationships, so that teachers become the transmitter of knowledge, the leader of the thinking, to play out their own professional advantages, to strengthen emotional exchanges with the students, to give the students enough space to learn, so that the students have more autonomy in their learning.

Under the background of "Internet +", the educational management of colleges and universities has got rid of the dependence on subjective experience and formed a new model based on big data analysis. The construction of the "Internet + education" platform is a prerequisite for the development and utilization of big data in college education management. To this end, on the one hand, colleges and universities can learn from the experience of other institutions in the construction of online education platforms, combined with the actual situation of their own institutions, to improve. On the other hand, colleges and universities should also provide funds and personnel for the construction of online teaching platforms to accelerate the construction of online education platforms.

Colleges and universities should rely on Internet technology to innovate teaching management methods, improve the efficiency and quality of teaching management, and better provide services for the development of teaching. Teaching management in the era of "Internet +" is more specific and operable. Utilizing the advantages of big data technology, strengthening the synergy between management departments, strengthening the communication and interaction of various management departments, and allowing the relevant departments of university teaching management to realize synergistic development, in order to improve the timeliness of teaching management and form a more flexible teaching management mode.

5. Conclusion

In this paper, under the model of Internet teaching management, based on the selection principle of evaluation indexes, the evaluation index system of Internet teaching management is established, and then seven schools in S city are taken as an example, and the combination assignment-TOPSIS method is utilized to carry out a comprehensive assessment of Internet teaching management.

The relative closeness of School F in S city is 0.622, which is the same as the prior standardized ranking, verifying the reasonableness of the evaluation index system constructed and the evaluation method applied in this paper. School F is following the footsteps of the times and actively innovating its teaching methods by using informatization technology, so it can be chosen as a model learning place. It has achieved better results in Internet teaching organization management (0.825) and Internet teaching quality management (0.995), but it needs to continue to improve.

In summary, under the background of "Internet +", promoting teaching innovation is needed for both teaching development and student development. The "Internet +" will provide unlimited possibilities for teaching, colleges and universities must strengthen the scientific knowledge of the "Internet +" and also need to strengthen the rational use of the modernization of teaching and learning to avoid too much reliance on digital tools. To this end, colleges and universities need to continue to promote the integration of traditional teaching and modern teaching mode based on information technology, so as to improve the teaching system and generate a unique teaching mode.

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