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Analysis of Student Evaluation from the Perspective of Competency for Enhancing the Competency Strategies of College Counselors

Gang Liu¹, Jingxi Liao²

Abstract

In the higher education system, college counselors play a crucial role. They are not only guides for student growth, but also the backbone of student ideological and political education and daily management. However, with the changes of the times and the diversification of student needs, the competence of college counselors is facing unprecedented challenges. Among them, student evaluation, as a direct way to reflect the effectiveness of counselor work has important reference value for improving the competence of counselors. This article analyzes in depth the importance and practical significance of student evaluation in enhancing the competence strategy of college counselors from the perspective of competence. Study the application algorithm of k-means algorithm as the research model. Collect basic information, work attitudes, and student management skills of counselors through a questionnaire survey. Then, using data mining techniques to process and analyze the collected data, key indicators and influencing factors of the counselor's ability are extracted. Through a review of a large number of relevant literature and field research, this article reveals the core role of college counselors in student education and management, as well as the key role of competence in their work. At the same time, this article elaborates on student evaluation as an important means of measuring the competence of counselors. It not only helps counselors to comprehensively understand their own work performance, but also provides targeted improvement directions for counselors.

Keywords: K-means algorithm; student evaluation; college counselors; competency.

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Introduction

In today's era of information explosion, data mining technology, with its powerful data processing and analysis capabilities, is gradually penetrating into various fields, including higher education management. As an important component of the higher education system, counselors play a crucial role in student management. Their competence is not only related to the growth and development of individual students, but also directly affects the overall quality and stable operation of higher education. Therefore, in the context of data mining technology, studying the competence of college counselors in student management has important theoretical significance and practical value. The development of college education is undoubtedly the role of the promotion of the overall world strength. It not only provides professional theoretical knowledge for the development of many industries, but also makes a large number of talents flow into the current industry development process (Kingston & Nash, 2011). Therefore, many countries and regions have already begun to vigorously develop the education industry, and through the improvement of relevant theories of the entire industry, the level of education has shown an increasing trend year by year (Phelan *et al.*, 2012). In the process of developing university education, it is of utmost importance for students to evaluate the students' professional talents and to develop tailor-made development plans for them later (Schneider & Meyer, 2012). So, under this development demand, the position for student evaluation has become an important trend in the development of many universities (Sudarma *et al.*, 2015). Effective counselors, as a post setting in the current development of higher education, have an important positive effect for better evaluation of students (Martí'nez & Herrera, 2012). Therefore, by improving the competency of college counselors in order to be able to better evaluate all students' personal abilities and qualities has become an important topic in the current university education (Li & Zhang, 2012).

With the rapid development of information technology, university management is facing unprecedented challenges and opportunities. The traditional student management methods are no longer able to meet the needs of modern education, and the emergence of data mining technology provides new ideas and methods for university management. By conducting in-depth mining and analysis of student data, we can more accurately grasp the learning, living, and psychological conditions of students, providing counselors with more scientific and effective management basis. The development of computer technology provides technical support for the analysis of massive data. Through the use of data mining technology to analyze the competency of counselors in colleges and universities, it can provide assessment of the competence of counselors and provide them with more accurate assessment for students in the later period. Data support (Özdağoğlu, 2012). In this study, the author will focus on the status quo of the under-research of college counselors' competency in China, and then introduce the K-means algorithm as

an example of effective counselor competency, which aims to provide a reference for the further development of Chinese college education.

Literature Review

In the context of the development of the times, the role of higher education has become particularly evident. Not only does it show that it can provide theoretical support for the development of all industries, but also through the continuous improvement of higher education, it also provides a venue for the training of talents in the development of the times (Kim & Kim, 2013). Some scholars believe that in the development of the era, the strength of a country's overall strength is positively related to the level of its education level (Goldhammer *et al.*, 2014). Only by constantly elevating the comprehensive level of its higher education can we accumulate follow-up forces for the development of the entire country (Greif *et al.*, 2014). Today, many universities and colleges in many countries have adopted a large number of new theory and techniques to support the development of higher education (Beaumont *et al.*, 2011). And in the process of education development, many studies have also realized that students need to be specifically targeted according to their personal abilities. Only in this way can students' interest in learning be improved, and then students can be better at what they are good at. The field lays the foundation for higher performance (Crook *et al.*, 2012). In many colleges and universities, the teaching position of the tutor has been set up. The setting of the position can be used as a communication method between the student and the teacher. The student's learning, life, and psychology acquired by the tutor can be used in various ways. The information can provide data support for colleges and universities to better understand the current status of students (Ryan *et al.*, 2019). Therefore, the counselor, as the backbone of the development of college education, has provided a positive influence on the self-recognition and the development of the overall strength of students in many developed Western education countries. The development of computer technology has made many data mining technologies begin to be applied to college education instructors for student evaluation (West & Turner, 2016). This emerging evaluation model can also help counselors make more systematic assessments of student abilities, reduce the shortcomings of traditional assessment methods, and ultimately provide data support for the improvement of students' comprehensive standards (Sabbaghan, 2013).

Data mining technology, as a powerful tool for processing and analyzing this data, is gradually changing the face of the education field (Guleria & Sood, 2013). Especially in predicting student grades, data mining techniques can reveal the patterns hidden behind the data, help educators better understand students' learning status, and thus develop more targeted teaching strategies (Adekitan & Noma, 2019). In the field of educational data mining, various technologies are widely

used for predicting student grades. Among them, algorithms such as decision trees, neural networks, and support vector machines have received widespread attention due to their excellent predictive performance (Nahar *et al.*, 2021). These algorithms can extract effective information from multidimensional data such as students' historical grades, learning behaviors, and family backgrounds, and construct predictive models to achieve accurate predictions of future grades (Nie *et al.*, 2020).

In order to compare the performance of these data mining techniques in predicting student grades, researchers conducted a series of empirical studies. By comparing the prediction results of different algorithms on the same dataset, we can discover the advantages and limitations of various algorithms in different scenarios (Persaud, 2021). For example, in some cases, decision tree algorithms may exhibit higher prediction accuracy, while in other cases, neural networks or support vector machine algorithms may be more suitable.

The field of higher education is undergoing a profound data revolution (Okewu *et al.*, 2021). In this revolution, Educational Data Mining (EDM) technology, with its powerful data processing and analysis capabilities, is gradually becoming an important force in promoting higher education reform and innovation (Namoun & Alshanqiti, 2020). Among them, artificial neural networks (ANN), as an important technology in the field of EDM, have received widespread attention due to their excellent ability in pattern recognition, prediction, and classification (Yang *et al.*, 2022). In the field of educational data mining, artificial neural networks are widely used in various aspects such as student performance prediction, learning behavior analysis, and course recommendation (Jones *et al.*, 2020). By constructing a prediction model based on neural networks, it is possible to accurately evaluate the learning status and ability level of students, and provide targeted teaching suggestions for educators.

More and more scholars are paying attention to the application of artificial neural networks in educational data mining (Tomasevic *et al.*, 2020). They use different neural network structures and algorithms to conduct in-depth research on different educational scenarios and problems. For example, some researchers use convolutional neural networks (CNNs) to analyze the learning behavior of students, by capturing subtle changes in their actions, expressions, etc (Charitopoulos *et al.*, 2020). In the classroom, to determine their learning status and interests. Other researchers use recurrent neural networks (RNNs) to analyze student learning time series data and predict their future learning performance (Chen & Liu, 2024). The core characteristics of blockchain technology lie in its decentralization, transparency, and tamper proof data storage method. In higher education, this feature provides unprecedented convenience for recording and verifying educational data. The traditional way of recording educational data has many drawbacks, such as data being easily tampered with and difficult to trace (Williams, 2019). The application of blockchain technology can ensure the authenticity and credibility of students' learning records, certificates, and honors,

greatly improving the fairness and transparency of the education process (Song *et al.*, 2021).

In the ability based blockchain education model, universities need to pay more attention to the cultivation and evaluation of student abilities. The traditional education model often places too much emphasis on grades and academic qualifications, while neglecting the cultivation of students' actual abilities (Sáiz-Manzanares *et al.*, 2020). Blockchain technology can record students' performance in various practical activities and project collaborations, providing educators with more comprehensive and objective evaluation criteria. This will encourage universities to pay more attention to cultivating students' abilities and promote the transformation of education from exam oriented education to quality education.

Methodology

After China experienced a long period of war, the country began to realize that only by continuously developing various industries and fields, and gradually approaching the developed countries in the world, can it provide an active impetus for China's sustainable development. However, in the development of various fields, the reserve and cultivation of talents is also an important basis for the development of the industry. Especially under the current trend of globalization of economic development, many enterprises are more aware of the urgency of training personnel. Only by cultivating a large number of talents can it be possible to promote a clearer understanding of the current state of the current situation in the development process, and to further introduce advanced theories so that these theories and techniques can be applied to the development process. Therefore, under the background of the development of this era, China has already begun to strengthen the development and investment in higher education, and a large number of colleges and universities have begun to be established, and the amount of talented personnel is increasing. In this study, the authors will conduct research on relevant data and conduct statistical data on the current investment in higher education in China and the amount of personnel training, in order to determine the current status of the development of higher education in China, and for the follow-up college education. The development and research of this topic provide theoretical basis and reference.

In the development process of college education, the cultivation of students' individuality is extremely important for enhancing students' self-ability. Therefore, this also requires the establishment of a specific position in many colleges and universities to have a real-time understanding and understanding of the student's current life, psychology, and learning status. Therefore, many colleges and universities in China also set up the job title of counselor. The content of the counselor's work is used as a summary and processing of the relevant data of the students' real-time situations, and the key links of the students' specific

individual ability development plan are proposed. Its role in the student's own development is also particularly important. Some educational scholars believe that the college counselor system in China has an important role for the students to better understand themselves and to correct them immediately when their own development trends become biased. Therefore, it is also one of the important research topics for the development of college education in China. However, in the traditional counselor system, because it often analyzes the current state of a student based on the student's learning level or other student's reaction, the analysis process may fail to accurately grasp the student's real-time dynamics. It has a negative impact on students' later development. The development of computer technology has provided technical support for the analysis of massive data in many industries. Therefore, in higher education, many research scholars in China have begun to try to apply computer data mining technology to the student appraisal system of the tutor. This kind of technology can collect a large amount of data for student evaluation and analyze it in real time. The K-means algorithm is a relatively late data mining technique that uses the data value of selecting the best individual competency value among all the personal ability values of the highly effective counselor as a research center, and then for other acquired data information. The value of the distance between the value and the selected best competency data value is averaged to determine the actual competency of the college counselor studied. This study is based on the understanding of the application principles of the K-means algorithm, and then the author based on its theoretical basis for the student evaluation of college counselors competency model, and then designed to provide technical support for follow-up research, and for the judgment of the actual college counselors' competency provides a basic reference for the model.

In order to determine the applicability of the college counselor competency judgment model set in this study, in this study, the author used the survey questionnaire to select the counselors from all universities in the province as the research object of this study. The total number of respondents was 557. The basic information of the investigators is shown in Table 1. The author conducted questionnaires on the main performance factors (leadership, efficacy, adaptability, innovation, and execution) of the competency of student appraisers of all investigators through questionnaires. The main performance factors investigated were all from the side. Reflects the actual assessment of the counselor for the student surveyed. The data of all the questionnaires were calculated using Excel software. The actual data obtained from the questionnaires were then statistically calculated using the above-mentioned K-means counselor competency model, and the level of competency of the provincial counselors was calculated. Conduct the analysis.

Table 1. Information Statistics for the Survey

Dimensions	Distributed	Number of people	Percentage
Gender	Male	259	46.7%
	Female	298	53.3%
Performance	High-performance counselor	223	40.2%
	General-performance counselor	334	59.8%
Full/Part-time Job	Full-time	500	89.9%
	Part-time	57	10.1%
Education	Undergraduate	49	9.0%
	Master's degree	491	88.0%
	PhD	9	1.8%
	Others	8	1.2%
College Type	985 Colleges and Universities	89	16.2%
	211 Colleges and Universities	154	27.4%
	Normal Colleges and Universities	259	46.3%
	Vocational Colleges	39	7.2%
	Private Colleges and Universities	16	2.9%

Based on the calculation of the competency of college counselors in the province, the author then calculated the differences in the competencies of counselors under different influencing factors (gender, age, training time, degree type, etc.) by using SPSS 22.0 software. Analysis, through determining the magnitude of the difference in the value of the competency force under different influencing factors, to determine which influencing factors are most likely to affect the competency of college counselors (this study uses the maximum value of the difference as the competence of the counselor. The most important factor is to provide reference for the improvement of college counselors' competency in the later period, and ultimately provide basic data support for college counselors in China to make more perfect assessments.

Result Analysis and Discussion

The Current State of Research on the Development of Higher Education in China

As China has entered a new period, the comprehensive level of the country's economy and other fields has achieved strong development. As the exchanges between China and the developed countries in the world continue to increase, the country has begun to realize that only by constantly improving its own talent pool can it lay the foundation for accepting more advanced knowledge theories. And some Chinese enterprises also recognize that the current development of science and technology also requires the exchange of talents in different fields, and this kind of development trend also requires China to increase investment in education. Especially in the new development situation of increasingly competitive incentives, the investment and development of higher education is even more important. The development of education not only promotes a clearer understanding of the advanced theories introduced in certain industries and fields in China, but also begins to gradually combine this series of advanced theories with its actual development history, and finally forms a The self-development model, which in turn provides a positive driving force for the development of innovative technologies throughout the industry. As a result, the development of higher education is a necessary product in the development of the times. In this study, the author analyzes and discusses the development status of the national education level in China for nearly half a century. The results are shown in Figure 1. The results show that China's investment in higher education is showing a growing momentum of development. Both the amount of funds invested and the number of educated people have continuously broken through the early stages and continuously created new data. This also indirectly proves that I have increased the emphasis on higher education, and only in this way can we promote the overall strength of China's higher education has greatly improved, and ultimately for the improvement of China's international influence and comprehensive development in various fields.

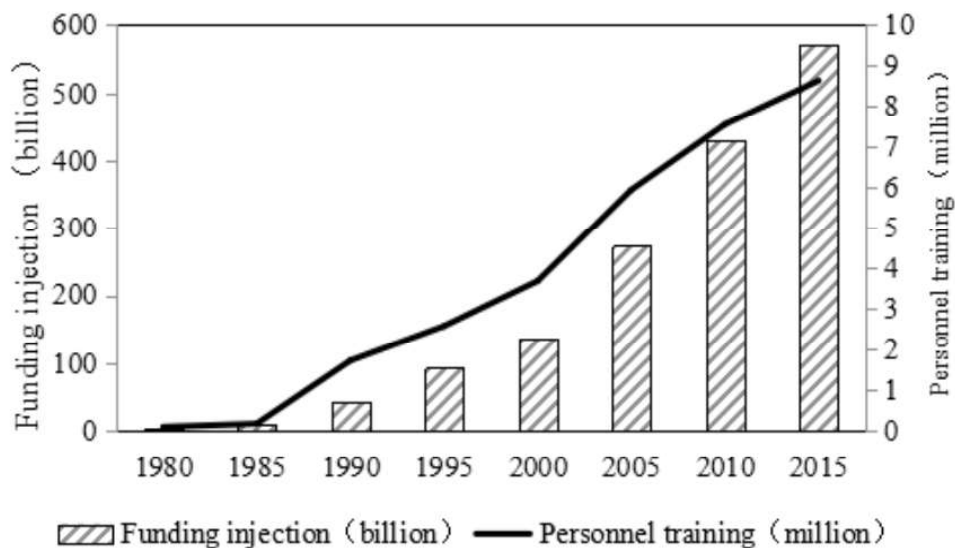


Figure 1. Results of research on the development of the current level of college education in China

Construction of Competency Judgment System for University Counselors Based on K-means Algorithm Student Evaluation

The use of data mining algorithms provides technical support for the development of more industries. Therefore, under this development advantage, data mining algorithms have begun to be applied to the judging system of college counselors' competency in China. Such as the K-means algorithm, this kind of algorithm can perform synchronous operation for massive data information, so that the reliability of the data support of the final judgment result is higher. Therefore, the counselor competency system based on the algorithm is greatly improved. In this study, the author constructed a model of the instructor's competency system based on the K-means algorithm for student evaluation. The operation model of the theoretical model is shown in Figure 2. From Figure 2, we can see that this model comprehensively analyzes and discusses the competency of college counselors that are influenced by many factors. The system's F1 (Innovative), F2 (Leadership), and F3 (Adaptability), F4 (Executiveness), and F5 (Efficacy) represent the key potential capabilities that can influence a tutor to level students. The improvement of these potential capabilities also shows a positive correlation with the promotion of counselors' competence. Therefore, in the actual counselor training process, these five potential abilities should be properly guided, so that college counselors can be more suitable for their jobs, and ultimately provide students with an accurate assessment of the positive driving force.

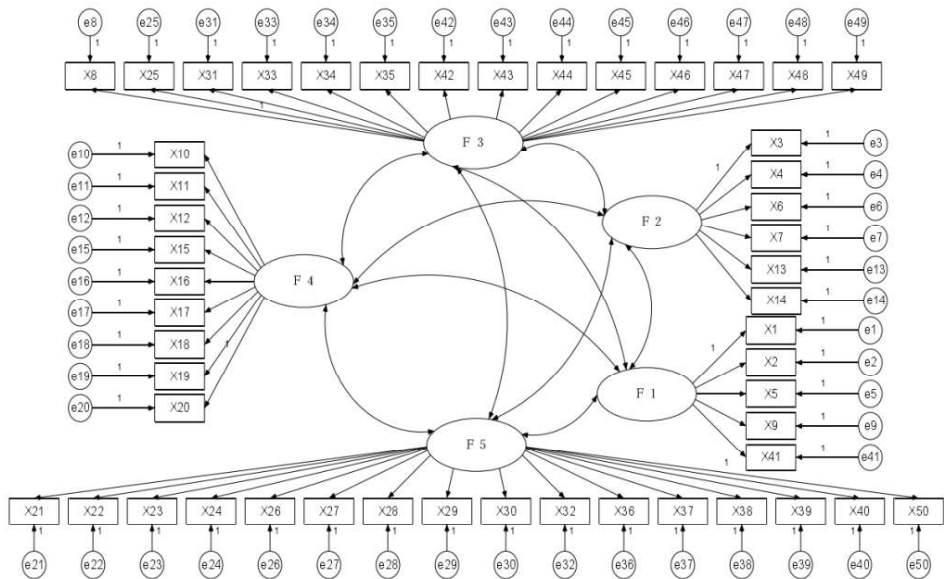


Figure 2. Running diagram of competency judgment model for college counselors based on K-means algorithm for student evaluation

Judging the Competency of College Counselors' Competency Judgment System Based on K-means Algorithm for University Counselors

The author takes 557 counselors from a college in a certain province as the actual research object, and then uses the student counselor competency judgment system based on the K-means algorithm to analyze and calculate the five main competencies, and finally passes the questionnaire. Methods Statistical analysis was performed on each potential capability. The results of the analysis are shown in Table 2. The results show that the college counselors have high potential values and their competencies are relatively strong.

Table 2. Judgment of University Counselor Competency Judgment System Based on K-means Algorithm for University Counselor Competency Judgment Result

Potential	Statistics	Minimum Statistics	Maximum Statistics	Average Value	Variance
F1	557	0.00	5.00	4.3112	0.5763
F2	557	0.00	5.00	4.7571	0.5907
F3	557	0.00	5.00	4.7866	0.6217
F4	557	0.00	5.00	4.5320	0.5974
F5	557	0.00	5.00	4.7042	0.6274
Capability	557	19.00	125.00	143.27	17.9979

The Results of the Analysis of the Differences in the Competency of College Counselors in Different Influencing Factors

In order to further determine what kind of factors affect the competency of college counselors, the author conducted a t-test analysis on the differences in competency of college counselors based on SPSS 22.0 software. The analysis results are shown in Table 3. The results show that under all influencing factors, education is the most influential factor for the province's college counselors' competency. Therefore, in the follow-up training and recruitment of college counselors, people with higher academic qualifications should be selected as much as possible. This may be because highly-educated personnel have a longer period of time in the university environment and are more accurate in their judgments. Therefore, they may have higher competency and thus more accurate evaluation of students.

Table 3. Results of the t-test analysis of differences in college counselors' competency under different influence factors

Dimensions	t value	Degree of freedom	P value
Gender	0.087	557	0.031
Performance	-1.239	557	0.136
Full/Part-time Job	2.189	557	0.413
Education	-2.303	557	0.026
College type	2.532	557	0.025

Conclusion

This study explores in depth the impact of student evaluation on the improvement of competence strategies for college counselors from the perspective of competence. By systematically analyzing the content of student evaluations and the performance of counselors, student evaluations are an important reference for enhancing the competence of counselors. As the direct audience of counselor work, students' evaluations can truly reflect the counselor's performance in communication, organization, emotional support, and other aspects. These feedbacks not only help counselors recognize their own shortcomings, but also provide them with specific directions for improvement. Secondly, student evaluation helps counselors develop targeted competency enhancement strategies. By analyzing the content of student evaluations in detail, counselors can identify areas where they need to focus on improvement and develop specific action plans. For example, in response to communication skills issues raised by students in evaluations, counselors can enhance their learning and practice of communication skills to improve their communication skills. In addition, student evaluation can also promote the overall optimization of the counselor team. By collecting and analyzing a large amount of student evaluation data, universities can understand the work status and competency level of the entire counselor team, and thus carry out targeted training and guidance. This not only helps to enhance the individual competence of counselors, but also promotes the professional and standardized development of the entire counselor team.

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