Research Article

Optimization of Teaching Management Informatization Construction in Higher Vocational Colleges Based on the Distributed Control System

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The fast growth of the information age brings many conveniences to all trades and industries. In particular, the reasonable use of information technology in instructional administration can enhance teaching quality and accomplish double the result with half the work. However, there are still some shortcomings in optimizing the information construction of instructional administration. To this end, this paper researched and discussed the building and enhancement of teaching management informatization in higher education institutions based on the distributed control system. It first briefly analyzed the construction ideas of teaching management informatization. The informatization construction of teaching management needs to be guided by the concept of informatization management and reform the teaching management concept in the traditional sense. The feasibility analysis of the teaching management system of multilayer distributed structure is carried out, and the comprehensive evaluation of the distributed teaching management information is carried out. The experimental results of this paper show that the overall average score of vocational teachers’ informatization teaching practice is 3.59; in the level of teachers’ informatization teaching ability, vocational teachers’ informatization professional practice ability is the weakest, with a comprehensive score of 3.13. Based on the distributed gray comprehensive evaluation system, the comprehensive evaluation of education and teaching management informatization is obtained. The level of education informatization of A1 higher vocational colleges is leading, and A2 higher vocational colleges and A3 higher vocational colleges rank second and third. It shows that certain achievements have been made in the construction of vocational education informatization in Province A, but at the same time, there are some problems.

1. Introduction

The rapid development of the information age has provided a lot of convenience for various fields, especially in teaching management, making full use of information technology can effectively improve the quality of teaching and achieve the goal of getting twice the result with half the effort. As the Internet grows fast, various emerging information technologies are unique and make people’s lives faster and easier, such as chip technology and sensors applied in various fields, as well as cloud computing, large data and the IoT. The large-scale use of various mobile devices and the constantly updated network infrastructure have brought about earth-shaking changes in various fields, such as the increasingly widespread use of 4G technology, the quietly coming 5G and wide-coverage WIFI, and the widespread use of smartphones and tablet PCs. With the changing times, it also poses more severe challenges to education, especially the important link strongly relevant to the sustainable growth of higher education institutions, such as teaching and learning administration. In the background of the new information era, if the informatization of teaching and learning regulation in higher educational organizations still cannot achieve transformational development, it will cause serious constraints to the sustainable growth of higher education.

Because teaching administration information technology offers benefits that conventional teaching does not, teaching administration information technology can handle information and also realize information interaction. Through informationization of instructional
administration, people can create a favorable instructional environment, improve students’ learning intentions, transform instructional ideas into information transmission, and ultimately promote quality of instructional management to achieve the purpose of high-quality and efficient instructional management. Based on the distributed control system, this paper studied and discussed the construction and optimization of teaching management informatization in higher vocational colleges, in order to provide a reference for the development and research of higher vocational education informatization.

This article studied and discussed the building and improvement of teaching administration informatization in higher education institutions based on distributed control system, and examined the development status of education informatization in higher education institutions. Combined with the Likert scale, it was found that the average score of teachers in the basic knowledge and skills of information technology was 3.78; the overall average score of vocational teachers’ informatization teaching practice was 3.59. The discussion in this regard can provide an effective reference for the peers of higher vocational college education informatization research and the further development and research of higher vocational college education informatization.

The innovations of this paper are reflected as follows: (1) The construction ideas of teaching management informatization are analyzed and discussed; (2) The feasibility analysis of the teaching management system with multilayer distributed structure is carried out, and at the same time, a comprehensive evaluation of the informationization of distributed teaching management is carried out; (3) The current situation investigation and data analysis of the teaching informatization construction of A higher vocational colleges are carried out.

2. Related Work

According to the research progress in foreign countries, different researchers have carried out corresponding cooperative research in teaching management informatization: The key theme of Boogie River’s research focuses on the psycholinguistic aspects of the teaching and learning process in foreign language classrooms. The role of psycholinguistics in this study was limited to intentional or unintentional code-switching by English teachers during the instruction of English to health information administration students [1]. Joseph described the way in which agile tenets directed the implementation of an IT program administration course for 3 distinct groups of students over the course of 3 academic years. An evaluation of these events showed a smart adaptation of these tenets to reach learning results and discussed the implications for agile classes study [2]. Guo established the medical information management professional practice teaching quality evaluation index system, and presented an approach to evaluation in the basis of the stepwise regression method for the medical information management professional practice teaching quality evaluation index, and professional suggestions were put forward to better improve the practice teaching level of medical information management specialty [3]. In the traditional design method of university instructional administration system, the system terminal had few user rights and the security of the whole system was very low. Shan C put forward the design method of cloud-based teaching education management system [4]. Lu analyzed the current case of management of physical education administration and explained the significance of data extraction skills for college physical education. Then, the construction approach of the university physical education instructional administration system was proposed, and the construction approach of the physical education data extraction system and the design of the physical education database were discussed [5]. However, these scholars still lack a certain technical demonstration on the research of teaching management informatization. After research, it was found that the study on the improvement of the information construction of teaching management on the basis of distributed control systems had certain reliability. In this regard, the relevant literature on distributed control systems has been consulted.

Currently, some scholars have conducted in-depth research on distributed structures: Yang proposed an efficient distributed solution for k-NN queries for moving objects to cope with the increasingly large data scale [6]. Hashemi proposed a new two-stage method for reactive power control in power systems. In the first stage, the transport network is divided into several parts using a partitioning method based on the graph concept. In the second stage, a hierarchical distributed architecture based on the concept of a system of systems is proposed for optimal reactive power scheduling [7]. There are multiple applications in the field of detection and estimation in distributed wireless sensor networks, including military surveillance, sustainability, health monitoring, and the Internet of Things. Zhang addressed the problem of estimating the structure of distributed wireless sensor networks [8]. Denisov proposed a quasi-distributed resistance sensor with a tree structure. The proposed sensor can measure the spatial distribution of physical quantities when only switching the measurement circuit to the external terminals [9]. Shimoda proposed a distributed parameter optimization method for material-oriented design, aiming to maximize the strength of laminated composite shell structures with anisotropic materials, which are homogenized based on lamination theory [10]. Alam conducted an in-depth discussion on the application and challenges of blockchain technology in education. On this basis, Alam presents a safe and reliable student file management framework [11]. Xu proposed a multiple verifiable searchable symmetric cryptographic algorithm, which provides an effective method for multiple keyword retrieval and fair retrieval [12]. Khalid hopes to build on the important land registry model to establish a concept certification system or framework that can be used for future applications. To enable the Pakistani government to implement a decentralized land registration system, Khalid has developed a conceptual framework and outlined some key elements [13].

However, these scholars did not research and explore the construction and optimization of computerized teaching
management in colleges and universities based on distributed control systems, but only discussed its significance one-sidedly.

3. Optimization Method of Teaching Management Informatization Construction in Higher Vocational Colleges

The optimization of educational informatization must require the realization of the starting point and ultimate goal of informatization, which is to achieve the best application effect with the best organizational form and form. The ultimate goal of analyzing is to make it work at its best. Therefore, in the design and selection of research objects in the research dimension, the concept of better development must be upheld, and the investigation is to propose more scientific promotion strategies. For this reason, this article studied and discussed the construction and optimization of instructional administration informatization in higher education institutions based on distributed control system.

3.1. Ideas for the Construction of Teaching Management Informatization. With the fast growth of IT, higher institutes of occupational and technological sciences have to take the road of computerization, and the computerization of education administration is the most basic application. The informatization construction of advanced professional education depends not only on the infrastructure of informatization but also on the expansion of data, the application of data, and the formation of new ideas and concepts. Therefore, the establishment of an open and shared educational resource and a cross-border educational resource is a prerequisite for realizing the informatization of educational management.

The information processing system of teaching management is an essential component of the management of higher occupational and technological education. By reconstructing and optimizing the instructional administration business process, a set of instructional management information systems that can meet the needs of instructional administration and services has been established to support and guide the improvement of instructional management efficiency, management quality, and management level. For example, a teaching management resource library, a student learning resource library, a course management system, an examination management system, and a multimedia information platform, etc. can be established to open up all the teaching-related subsystems of the campus network, so that each subsystem can be used to provide services for teaching management. Figure 1 shows the management of teaching informatization construction.

The informatization construction of teaching management needs to be under the guidance of the information management principle, and reform the teaching management concept in the traditional sense. In the course of construction teaching management informatization, the informatization needs of staff and students, the informatization pursuit goals and the informatization results to be achieved should be placed first in the informatization planning, such as the application of multimedia teaching content, online correction of homework, online examination, and other information-based teaching applications. As teachers, they must change their thinking, and turn the past paper-based lesson preparation to one that is supplemented by paper and mainly based on information tools, incorporate more teaching content into information-based teaching, strengthen the application and processing of existing resources, so as to relieve stress at work of teaching managers, continuously promote the quality of teaching and learning and efficiency of teachers, and improve the entire school rather than a certain manager’s teaching management level, and accomplishing these tasks is the goal of higher occupational institutes to reform educational and instructional management. The construction of teaching management informatization is beneficial to changing ideas and concepts of education, promoting teaching reform, accelerating the modernization of education and teaching, realizing modern management means, and promoting the transformation of teaching management ideas. In addition, the school management needs to change their concepts, study hard, become familiar with and master Internet technology, and apply it in various teaching management activities to truly guide the informatization development of education and teaching.

3.2. Feasibility Analysis of the Multilayer Distributed Structure Teaching Management System. The feasibility analysis of the multilayer distributed structure teaching management system is to analyze the current actual conditions, so as to judge whether the construction of the multilayer distributed structure teaching management system can be carried out.

In the feasibility analysis of the multilayer distributed structure teaching management system, we must be careful, if there is a little mistake, it will lead to a lot of loss of human, material, and financial resources.

Usually, a feasibility analysis from three perspectives, technical, economic, and operational, must be carried out.

3.2.1. Technical Feasibility. With the evolution of computing technology, the growth of multilevel distribution structure has become a promising method. From a software perspective, Windows XP is a good platform, it has strong flexibility and good security, and it can well integrate communication services.

The system is compatible with Windows XP system, and combines it with MSSQL Server 2000, making it more integrated and more consistent. JAVA uses JAVA as the development language. On the one hand, JAVA has all the characteristics of client-side development tools. On the other hand, JAVA supports data more comprehensively than other languages [14].

3.2.2. Economic Viability. First, a large number of computers have been deployed in the offices and laboratories of the various colleges of the school, and at the same time, the computer network has been established. Second, the main accessories in the computer have lower price and higher
performance. Therefore, the configuration of the server can be greatly improved with a very small investment, thereby further significantly increasing the total efficiency of the system [15].

3.2.3. Operational Feasibility. The multilayer distributed structure teaching management system generally chooses the Windows XP style interface, and at the same time, the corresponding help can be provided to the user [16]. Therefore, on the one hand, the user can be greatly facilitated, and on the other hand, the user’s work interest can be greatly stimulated [17].

To sum up, it is very feasible to find, design and implement a multilayer distributed structure teaching management system. In this regard, this paper conducts a comprehensive evaluation on the informatization of distributed teaching management [18].

3.3. Comprehensive Evaluation of Distributed Teaching Management Informatization. Comprehensive evaluation is a global and holistic evaluation of the target system of the multiattribute architecture. The basic steps of comprehensive evaluation are shown in Figure 2.

Generally, a variety of mathematical methods such as expert evaluation, economic analysis, and operations research are used for evaluation. The most commonly used method is the third type, multiobjective decision-making, AHP, fuzzy comprehensive evaluation, gray comprehensive evaluation, and so on. This paper applies a new distributed-based gray comprehensive evaluation method.

3.3.1. The Concrete Steps of Gray Comprehensive Evaluation. The first stage is the choice of assessment criteria, and secondly, the weight of each indicator is calculated, and the weight of each indicator is worked out by working with a distributed analytical hierarchy procedure.

To sum up, it is very feasible to find, design and implement a multilayer distributed structure teaching management system. In this regard, this paper conducts a comprehensive evaluation on the informatization of distributed teaching management [18].

3.3.1. The Concrete Steps of Gray Comprehensive Evaluation. The first stage is the choice of assessment criteria, and secondly, the weight of each indicator is calculated, and the weight of each indicator is worked out by working with a distributed analytical hierarchy procedure.
The second gray class: weaker, the whitening weight function is
\[ g_2(t) = \begin{cases} \frac{t}{2}, & t \in [0, 2], \\ \frac{(4-t)}{2}, & t \in [2, 4], \\ 0, & \text{other}. \end{cases} \]

The third gray class: general, the whitening weight function is
\[ g_3(t) = \begin{cases} \frac{t}{3}, & t \in [0, 3], \\ \frac{(6-t)}{3}, & t \in [3, 6], \\ 0, & \text{other}. \end{cases} \]

The fourth gray class: strong, the whitening weight function is
\[ g_4(t) = \begin{cases} \frac{t}{4}, & t \in [0, 4], \\ \frac{(8-t)}{4}, & t \in [4, 8], \\ 0, & \text{other}. \end{cases} \]

The fifth gray class: very strong, the whitening weight function is
\[ g_5(t) = \begin{cases} \frac{t}{5}, & t \in [0, 5], \\ 1, & t \in [5, \infty], \\ 0, & \text{other}. \end{cases} \]

**Step 5.** Collect expert score sheets. Provide experts with relevant information on the growth of education information technology in higher professional institutions in A province, and combine the reality of higher professional institutions on the basis of all levels in the index system, and score according to the evaluation grade standards.

**Step 6.** Calculate the gray evaluation coefficient. For the evaluation index \( c_{nm} \), the gray evaluation coefficients belonging to \( q \) evaluation gray categories are recorded as \( A_{nmq} \), and the total gray evaluation coefficient is \( A_{nm} \). The calculation formula is
\[ A_{nm} = \sum_{q=1}^{5} A_{nmq} \cdot \frac{A_{nmq}}{A_{nmq}} = \sum_{h=1}^{i} g_q(t_{nmh}). \]

Among them, \( t_{nmh} \) represents the score given by the \( h \)th expert to the evaluation index \( c_{nm} \).

**Step 7.** Construct the gray evaluation weight matrix. The gray weight \( u_{nmq} \) of the \( q \)th gray class,
\[ u_{nmq} = \frac{A_{nmq}}{A_{nm}}. \]

By synthesizing the gray evaluation weights of the second-level indexes to which each first-level index belongs to evaluating gray classes, the gray evaluation weight matrix \( U_n \) is obtained:
\[ U_n = \begin{bmatrix} u_{n1} & \cdots & u_{n15} \\ \vdots & \ddots & \vdots \\ u_{nhi} & \cdots & u_{nh5} \end{bmatrix}. \]

**Step 8.** Comprehensively evaluate the evaluation indicators. A comprehensive evaluation is carried out on the secondary indicators, and the evaluation result is recorded as \( Y_n \):
\[ Y_n = V_n \cdot U_n \]

To this end, all secondary indicators \( Y_n \) are evaluated, and the gray weight matrix \( U \) for the primary indicators is obtained:
\[ U = \begin{bmatrix} Y_1 \\ Y_2 \\ \vdots \\ Y_p \end{bmatrix}. \]

Among them, \( V_n \) is the weight value of the first-level index obtained by the AHP.

**Step 10.** Calculate the comprehensive evaluation value. Then the target comprehensive evaluation value \( X \), the calculation formula is \( X = Y \cdot Z^T \), where \( Z \) is the gray level, 
\[ Z = [1 2 3 4 5]. \]

**4. Experimental Results**

To study the development status of informatization in Class A higher education institutions more comprehensively, the survey target of questionnaire 1, that was, the development status of educational informatization in Class A higher education institutions, was 89 higher education institutions. A total of 89 surveys in all were distributed, and 89 effective surveys were received, with 100% return rate. Questionnaire 2, that was, the subject of the survey on teachers’ ability of informatization instruction in higher vocational institutions, was the first-line teachers in higher vocational institutions. According to the ratio of A1, A2, and A3 higher vocational colleges: 14: 3: 5, 220 surveys were sent out in total, and 200 effective surveys were recovered.
4.1. Application of Teaching Informatization

4.1.1. Overview of the Professional Development of Vocational Teachers. Of the 200 valid questionnaires returned, 95 (47.5%) were from male teachers and 105 (52.5%) were from female teachers. The age of teachers in higher vocational colleges was distributed from 25 years old to 45 years old and above, of which the higher proportion was the group of 26–35 years old and 36–45 years old, accounting for 43.5% and 39.0%, respectively. These two groups were the main force of the teacher group, new teachers under the age of 25 years old and 36–45 years old, accounting for 43.5% and 39.0%, respectively. These two groups were the main force of the teacher group, new teachers under the age of 25 years old and 36–45 years old, accounting for 43.5% and 39.0%, respectively. These two groups were the main force of the teacher group, new teachers under the age of 25 years old and 36–45 years old, accounting for 43.5% and 39.0%, respectively. These two groups were the main force of the teacher group, new teachers under the age of 25 years old and 36–45 years old, accounting for 43.5% and 39.0%, respectively.

Corresponding to the age of teachers was the teaching age of teachers. Corresponding to the age distribution, the proportion of teachers with teaching years of 11–20 years was 43.5%, with a total of 87 people, followed by people who had taught for more than 21 years, accounting for 28.5%. It could be seen that the teaching years of higher vocational teachers were generally longer, and the age at the time of entry was relatively young, as shown in Figure 4.

In the distribution of professional titles, the proportion equivalent to lecturers was the highest, accounting for 57.0%, with 142 people, 68 people with associate professor titles, accounting for 27.3%, and teaching assistants accounting for 11.7%. The number of teachers with the status equivalent to professors was the least, only 5 people, accounting for 2.0%, as shown in Figure 5.

The construction of “dual teachers” and dual part-time status of higher vocational teachers have a significant influence on their professional teaching, so the questionnaire also investigated whether they had worked in enterprises. It was found that teachers who had never worked in enterprises or who had only 1–2 years of experience accounted for the highest proportion, the former was 78 teachers accounting for 39%, and the latter was 71 teachers accounting for 35.5%. There were only 15 teachers who had worked in enterprises or part-time for more than 5 years, as shown in Figure 6.

Improving teachers’ informatization level through network technology competition is a major measure to vigorously promote the construction of educational informatization in China recently. The results of the survey are shown in Figure 7. The situation of participation in the informatization teaching competition was polarized. The number of people who participated in the national competition was similar to the number of people who had not participated in the competition. The former accounted for 35.5%, and the latter accounted for 36%, only 1 person-time difference. The rest of the teachers who participated in the provincial and municipal two-level informatization teaching competitions were 39, accounting for 19.5%, and the number of teachers who only participated in the two-level informatization teaching competitions in colleges and universities was 18, accounting for 9%.

In the last two years, training related to informative teaching skills of the teachers tested showed that there were 56 teachers who had not received training once, accounting for 22.5%, and teachers who had once and twice accounted for 9.7% and 36.5%, respectively, the maximum number of people trained twice was 91. There were 78 people who had been trained three times or more, accounting for 31.3%, which showed that teachers had received a relatively high number of training related to informatization teaching ability, as shown in Figure 8.

4.1.2. Evaluation of Teachers’ Information Ability Level. The second part of the questionnaire had a total of 20 questions, all of which were 5-point Likert scales. The research comprehensively counted the abilities of teachers from four dimensions: consciousness and attitude, foundation and skills, teaching practice, and professional practice. Each subquestion was set up with five levels of “completely disagree, disagree, uncertain, agree, strongly agree” to test the current situation of information technology teaching skills for professional teachers. The score of each option was 1, 2, 3, 4, 5 points. The following analyzed the overall results of the questionnaire from the distribution of four dimensions.

The awareness and attitude of higher vocational teachers to information-based teaching were measured by the items shown in Table 1. From the perspective of vocational education, this paper examined teachers’ understanding of the application of information science and technology in higher education institutions and their attitudes and trends in practical teaching. In a word, the overall score for “Application and Cognition” was 4.05, which was generally “agree,” indicating a positive use of information technology across vocational schools.

The basic skill level of vocational teachers’ informatization teaching was investigated through the items in Table 2. The survey found that the overall score of teachers in the field of using IT and basic technology was 3.78, which was still consistent on the whole, but there was a certain deviation on the whole. Teachers as a whole had a good ability to apply information technology, but the distribution of specific abilities showed that not all teachers could effectively master the relevant technology.

The practical ability of information-based teaching for higher professional teachers is the reflection of the comprehensive ability of teachers’ classroom practice such as teaching preparation, teaching resource development, teacher implementation, teaching management, and evaluation. The statistical results of the survey are displayed in Table 3. The overall average grade of the items in the informatization teaching practice of the higher vocational teachers was 3.59, and the overall mastery of the informatization teaching practice by the teachers generally had a standard deviation of 0.452 and a variance of 0.204, the overall deviation was not large, but there were obvious group differences in individual items. Among them, teachers had a good grasp of teaching preparation, media selection, and resource development, but there were great differences in the application of some specific teaching methods and the use of network tools.

The “dual-professional” position of teachers in higher professional institutions and their emphasis on practical demonstration require that this study cannot ignore the
Figure 3: Age distribution of teachers in higher vocational colleges.

Figure 4: Distribution of teaching age of teachers in higher vocational colleges.
important feature of “professionalization” in the investigation of their informatization teaching level. Therefore, the questionnaire was designed as shown in Table 4 about the problems that higher vocational teachers would involve in teaching related to professional practice, and used this to measure present status of their professional practice. By statistics of the questionnaire results, it was found that in the information-based teaching of teachers, vocational teachers in higher professional institutes had the weakest informatization vocational practice ability, and the comprehensive
score was only 3.13, which was the lowest among the four preset dimensions, indicating that most teachers had deficiencies in information technology and professional practice.

4.1.3. Various Modes of Teaching Management. A survey of 89 higher vocational colleges shows that 85.7% of them have set up special departments in charge of school informatization construction and planning, and 14.3% of higher
| Table 1: Higher vocational teachers’ awareness and attitude of informatization teaching. |
|---------------------------------------------------------------|
| **Questions/Options**                                         | Totally disagree (%) | Disagree (%) | Uncertain (%) | Agree (%) | Very much agree (%) | Average score |
| Using information technology in teaching can improve teaching efficiency | 1.3 | 4.1 | 16.3 | 45.4 | 32.9 | 4.05 |
| The use of information technology in teaching can promote teaching reform | 0 | 2.1 | 10.8 | 51.5 | 35.7 | 4.19 |
| Using information technology in teaching can make teaching content more vivid | 0 | 1.1 | 8.1 | 49.1 | 41.7 | 4.29 |
| Using information technology in teaching has lightened my teaching burden | 3.9 | 11 | 30.5 | 32.8 | 21.8 | 3.61 |
| Using information technology in teaching to improve teaching quality | 0.3 | 3.3 | 13.7 | 52.1 | 30.6 | 4.11 |

| Table 2: The basis and skills of higher vocational teachers’ informatization teaching. |
|---------------------------------------------------------------|
| **Questions/Options**                                         | Totally disagree (%) | Disagree (%) | Uncertain (%) | Agree (%) | Very much agree (%) | Average score |
| Announcement to students through the Internet | 5.3 | 14.1 | 24.6 | 32.8 | 23.2 | 3.56 |
| Provide information resources to students through the Internet | 0 | 3.9 | 32.2 | 36.6 | 27.6 | 3.91 |
| Q&A and discussion with students using the Internet | 0 | 8.7 | 21.4 | 40.5 | 29.4 | 3.91 |
| Do a network test | 0.3 | 5.3 | 40.2 | 34.4 | 19.8 | 3.71 |
| Arrange and correct assignments through the network | 2.3 | 6.9 | 19.4 | 53.2 | 18.2 | 3.81 |

| Table 3: Higher vocational teachers’ information-based teaching application practice. |
|---------------------------------------------------------------|
| **Questions/Options**                                         | Totally disagree (%) | Disagree (%) | Uncertain (%) | Agree (%) | Very much agree (%) | Average score |
| I am well aware of the role and purpose of instructional design and design instructional programs. | 0 | 4.1 | 6.3 | 56.5 | 33 | 4.21 |
| I know how to choose a reasonable and effective information-based teaching method for teaching | 0 | 1.1 | 18.1 | 58.9 | 21.9 | 3.99 |
| I can independently complete a teaching plan that reasonably applies information technology | 5.5 | 17.9 | 24.2 | 33 | 19.4 | 3.42 |
| I can complete an online course design for a course or an activity unit | 7.5 | 17.4 | 42.6 | 20.6 | 11.9 | 3.13 |
| I can use information-based teaching evaluation tools to evaluate students in teaching | 14 | 19.4 | 14.5 | 34.6 | 17.5 | 3.23 |

| Table 4: Vocational practice of informatization of higher vocational teachers. |
|---------------------------------------------------------------|
| **Questions/Options**                                         | Totally disagree (%) | Disagree (%) | Uncertain (%) | Agree (%) | Very much agree (%) | Average score |
| I can skillfully apply the means of informatization to guide students in production practice and training | 5.9 | 18.2 | 45.4 | 18 | 12.6 | 3.14 |
| I can select appropriate information tools to record professional practice activities and evaluate the process and results of the activities. | 17 | 32.8 | 8 | 18.6 | 23.6 | 3.01 |
| I can guide students to take professional skills qualification test through information technology | 9.7 | 26 | 17.3 | 20 | 27 | 3.31 |
| I can effectively use information technology in school-enterprise cooperation | 10.9 | 22.6 | 26.4 | 29.3 | 10.7 | 3.07 |
| I can know that students use information technology to understand occupational needs, make career planning, prepare for job hunting, etc. | 7.3 | 17.6 | 42.6 | 20.4 | 12.1 | 3.13 |
vocational colleges’ education informatization construction is managed by multiple departments. Specifically, 42.9% of the informatization construction and planning administration of higher professional institutes are in charge of the modern education technology center. 21.4% of the informatization of higher vocational colleges is in charge of the graphic information center. 7.1% of the informatization of higher vocational colleges is in charge of the information network center. The informatization management department undertakes 14.3% of the informatization planning, construction, and management of colleges and universities. In the informatization construction of colleges and universities, 14.3% have not established professional institutions for college informatization construction and planning. At present, there are several different modes of education informatization management system in higher vocational colleges, but the modern educational technology center is the main leading institution of educational informatization in higher vocational colleges. The role of the information office in higher vocational colleges in our province has not been highlighted, and the role played in higher vocational colleges is still relatively small, and the proportion of information office in higher vocational colleges is also relatively low. The institution has yet to grow and play an important role in the planning and development of educational informatization in higher vocational colleges. In addition, there are still 14.3% of higher vocational colleges that do not have a special information construction and planning department. The informatization work of higher vocational colleges is completed by each department according to the division of functions, and there is a lack of unified management and planning.

Comprehensive evaluation of education informatization in higher vocational colleges in A province: The evaluation system of the development status of education informatization in higher professional institutes in A province belongs to a distributed gray system. First, the academic evaluation study of information technology in education development is still immature, and the information on the influencing factors, hierarchical classification and index selection of educational informatization development is incomplete. Second, for the growth of education informatization in higher professional institutes in A province, some of the selected evaluation indicators and data are known and can be represented by data. However, some data are unknown, and can only be evaluated by the level of degree. Thirdly, there are both quantitative (whitening) and qualitative (gray) indicators in the established evaluation indicators. Therefore, the research system has the gray characteristic of incomplete information. On the basis of the foregoing analysis, this Article will use the distributed gray model to evaluate the development status of education informatization in higher professional institutes in A province.

On the basis of the distributed gray evaluation system, the comprehensive evaluation values of the first-level indicators of A1 higher vocational colleges, A2 higher vocational colleges, and A3 higher vocational colleges are obtained, as illustrated in Table 5, and the consolidated assessment value of the total target is illustrated in Table 6.

From the gray comprehensive evaluation results, it can be seen that in terms of infrastructure construction, teaching informatization application, informatization management, and organizational security systems. The scores of A1 higher professional institutes are higher than that of A2 higher professional institutes and A3 higher professional institutes, and the score of A2 higher professional institutes is also higher than that of A3 higher professional institutes. However, the overall gap between A2 higher professional institutes and A3 higher professional institutes is not large. In the total score of the comprehensive evaluation, A1 higher professional institutes have the leading level of education informatization, A2 higher professional institutes, and A3 higher professional institutes rank second and third.

| Table 5: Comprehensive evaluation of first-level indicators. |
|-------------|-----------------|-----------------|-----------------|
| First-level indicator | A1 higher vocational colleges | A2 higher vocational colleges | A3 higher vocational colleges |
| Infrastructure | 4.12 | 4.01 | 3.96 |
| Teaching information application | 4.07 | 3.89 | 3.82 |
| Informatization management | 4.14 | 4.01 | 3.98 |
| Organizational guarantee system | 4.13 | 4.01 | 3.99 |

| Table 6: Overall comprehensive evaluation value. |
|-------------|-----------------|
| General goal | Level of informatization |
| A1 | 4.1 |
| A2 | 3.9 |
| A3 | 3.85 |

5. Conclusions

The multilayer distributed structure teaching management system must have the advantages of high security and good data confidentiality. For accurately grasping the growth status of education informatization in higher professional institutes in A province, 89 higher professional institutes in the province were investigated. By analyzing the data from the surveys, it is found that while the vocational education informatization construction in the province has achieved certain achievements, there are also the following problems: Some higher vocational colleges information planning is difficult to implement. It is difficult to share information sources among vocational colleges, and there is a Shortage of coordination and cooperation mechanism. The applied dimension of teaching informatization is low, which fails to demonstrate the advantages of a strong education province. The organizational management system of some higher professional institutes is fragmented and the operating mechanism is imperfect. The informatization guarantee
system is not well developed, and the innovation of education informatization is insufficient. In this regard, a professional organization should be established to uniformly manage the education informatization construction of various higher professional institutes. Do great work in the statistical work on the annual development of educational informatization in higher professional institutes, and do great work in the development planning of educational informatization in higher professional institutes. Establish informatization supervisors, clarify the responsibilities of informatization supervisors, improve the leadership of informatization supervisors, etc., and improve the education informatization management system in higher professional institutes. The purpose is to offer a guide to the peers of higher professional institutes education informatization research and the further growth and research of higher vocational college education informatization. Due to the limited time and research conditions, the strategies proposed in this paper are not comprehensive enough. It is hoped that it will play the role of attracting new ideas, so that more people can make suggestions for the construction and development of education informatization in higher vocational colleges.

Data Availability

The data used to support the findings of this study are available from the corresponding author upon request.

Conflicts of Interest

The author declares that there are no conflicts of interest.

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