Research Article

An Evaluation Method for the Construction of Double-Qualified Teachers in Vocational Schools Based on ID3 Algorithm and Neural Networking

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In vocational schools, the traditional evaluation approach of forming a double-qualified teaching team has the issue of an imperfect evaluation standard, resulting in low accuracy. Based on the ID3 algorithm, this research develops an evaluation technique for double-qualified teacher team construction in vocational schools. The characteristics of dual-teacher education are gathered, customized training plans are produced, and the selection mechanism for vocational school teachers is maximised based on the requirements of students’ vocational ability training. By calculating the information gain of each attribute, the ID3 algorithm is used to formulate teacher evaluation standards, and dimensionless post-data are comprehensively processed to design the evaluation mode of teacher team construction. Experimental results: the average accuracy of the evaluation method for the construction of double-qualified teachers in vocational schools based on association rules, as well as the other two evaluation methods, was 69.959%, 58.851 percent, and 58.744 percent, respectively, indicating that the evaluation method for the construction of double-qualified teachers in vocational schools integrated with the ID3 algorithm was more accurate.

1. Introduction

The vocational education circle coined the term “double-qualified teacher” to describe the characteristics of Chinese vocational education and the construction of foreign vocational education teachers. It is an initiative in the vocational education circle of our country. “Double-qualified” teachers are the quality requirements for professional teachers according to the needs of cultivating applied talents in vocational education. The formulation of “double-qualified” teachers is put forward on the basis of summarizing and analyzing the training and construction experience of foreign vocational education teachers and the specific background of our country. According to this requirement, the vocational education circles creatively put forward the concepts of “double-qualified” teachers, “integrated” teachers, “double-qualified” teachers, “double-capable” teachers, “double-certificate” teachers, and so on. This specific background is the phenomenon of emphasizing theory, neglecting practice, emphasizing the teaching of knowledge, neglecting ability training and knowledge application in China’s previous vocational education, unreasonable sources of teachers, lack of professional practical experience and professional practical ability, emphasizing the theoretical level and ignoring practical teaching links in the construction and evaluation of teachers, etc. People are more accustomed to utilising the title of “double-qualified” instructors as a result of current theory and practice in the building of vocational education teachers. To meet the demand for talents in the rapidly developing economy and society, various countries adopt multichannel and various forms of training high-quality teachers and allowing students to participate in the teaching process in order to meet the demand for talents in the rapidly developing economy and society [1]. The
following are the main points of view on what it means to be a "double-qualified" teacher: (1) teachers with intermediate or above teacher titles and professional and technical positions such as engineers (agronomists and technicians); (2) teachers with teacher qualification and professional qualification certificates in relevant industries (such as lawyer qualification certificate and doctor qualification certificate). The channel of secondary vocational education teacher training in developed countries is that culture teachers are generally trained by ordinary colleges and universities or normal colleges; (3) teachers with both teacher qualifications and professional and technical level certificates in relevant industries (such as lathe workers and fitters). There are two main channels for professional course teachers: one is from general colleges and universities or colleges of education established in these colleges and universities that can grant professional teacher qualification diplomas; (4) teachers who are competent for both theoretical teaching and professional practice courses; and (5) teachers with a teaching certificate and more than two years of practical work experience in the front lines of grass-roots production, construction, service, and management, as well as teachers with intermediate or above teacher titles, are qualified to guide the practical teaching of their specialty. For example, the United States, Australia, and Germany all belong to this type. Vocational school teachers in these countries generally graduate from engineering colleges and obtain a bachelor’s degree, and then go to the education department or college of normal universities or vocational education and training units to study educational theory, production practice, and educational practice. Only after passing the examination can they obtain the qualification of teaching. Teachers who preside over or mainly participate in two or more applied research projects, and the research results have been actually applied by society, enterprises, and institutions, with good economic and social benefits. The Internet of Things (IoT) is a shared network of objects that can connect with one another online. Different facets of human existence are currently being shaped by the Internet of Things (IoT) technologies. A network of dispersed (sensor) nodes, (cloud) servers, and software makes up the Internet of Things (IoT). The training of teachers in secondary vocational education in the United States is a four-year teacher preparation education with a bachelor’s degree in educational courses or majors with different meanings such as vocational education, industrial technology education, and applied technology education established in some universities or colleges of education. At present, the academic literature on the combination of the ID3 algorithm and the evaluation method of the construction of double-qualified teachers in vocational schools is not very rich, which needs to be further discussed.

2. Evaluation Method of Double-Qualified Teachers’ Team Construction in Vocational Schools Based on the ID3 Algorithm

2.1. Acquiring the Characteristics of Dual-Teacher Education. As per the real circumstance of educators, the method of characterized administration and customized preparing ought to be embraced to develop instructors’ quality precisely. In terms of content selection, different cultivation contents should be selected according to teachers’ personality characteristics, educational background, and professional practice experience. In the career of teachers, for example, part-time teachers recruited from enterprises or teachers entering vocational colleges from enterprises, emphasis should be placed on strengthening education quality cultivation, such as pedagogy, educational psychology, and vocational education theory [2], to accomplish the compelling advancement of instructors’ schooling level and ability to educate. The essential characteristics of the development of double-qualified educators in vocational schools are shown in Figure 1:

As should be visible from Figure 1, the fundamental characteristics of the development of double-qualified educators in vocational schools principally incorporate impressive skill, collaboration, practicality, and long haul nature. Vocational schooling is a unique sort of training, which has its identity which is not tracked down in essential schooling and advanced education. For teachers from school to school, emphasis should be placed on the cultivation of professional practical skills, such as regular practical skills training, professional teachers should be organized to participate in the theoretical knowledge and practical skills operation training of vocational skill level appraisal by national or industrial organizations. Broadly speaking, teachers of vocational education refer to those who have been engaged in education and teaching in vocational colleges for a long time, including administrators, educators, and service providers of vocational colleges. From a limited perspective, vocational schooling educators allude to full-time instructors participated in training and showing in vocational universities for quite a while, including instructors of public courses, fundamental courses, and concentrated courses. In this way, the focal point of the exploration on the development of vocational schooling educators at home and abroad is the instructors of particular fundamental courses and vocational abilities courses, even the educators of specific courses. School-venture participation is the collaboration between
the instruction office and the business division, which is a two-way collaboration. Both are active cooperation under the premise of satisfying their own development. In other words, from the perspective of diversified teaching, the focus and difficulty of teacher team construction in vocational colleges lies in the cultivation and training of teachers of specialized courses, and the key is to improve teachers’ teaching skills and professional post skills [3]. Schools and enterprises establish cooperative relations, relying on the production equipment and advanced technology of enterprises, so that they can serve the development of schools, effectively improve the school grade, and constantly optimize the school teacher team. Vocational education takes training highly skilled personnel as its own duty. According to the requirements of students’ vocational ability cultivation, we set up specialized basic courses, specialized courses, skill courses, and on-the-job practice courses for the cultivation of high-skilled talents. The combination of doing and learning is the prerequisite for improving students’ special vocational ability and promoting students’ smooth employment. Based on the above description, the steps were completed to obtain the characteristics of dual-teacher education.

2.2. Optimizing the Selection Mechanism of Teachers in Vocational Schools. The choice of “double-qualified” educators ought to be from full-time educators or part-time educators, which really mirrors that creation practice or showing practice ought to be accentuated first in instructor preparing. Vocational and specialized schools are particular organizations for preparing vocational school educators. They are complete universities with the solidarity of ordinary, specialized, and scholarly nature. They mostly attempt the preparation undertaking of educators of short majors and concentrated courses overwhelmingly popular and develop vocational school instructors with typical hypothesis, vocational hypothesis, and commonsense abilities. It is mainly for secondary vocational schools (vocational high school, technical school, vocational secondary school, etc.) to train professional teachers and practice teachers. We believe that it is still necessary to see which way is easier for teachers to get better and faster development. From the perspective of teaching performance evaluation, the trained students, like the teachers trained in normal colleges and universities, should not only have rich professional theoretical knowledge, simple oral expression ability, good teacher ethics of teaching and educating people, and words and deeds but also have strong practical operation ability and the ability to engage in teaching activities [4–6]. The teaching of vocational schools aims at cultivating students’ production practice and skills. As an important aspect of teaching content, production practice and skills require teachers to impart production skills and production experience to students [7, 8]. The specific selection strategy is shown in Figure 2:

As can be seen from Figure 2, the teacher selection strategy specifically includes four aspects: low vocational and high employment, priority rights, increased allocation of funds, and improved treatment. If these are lacking, then teachers’ educational literacy can be imagined, let alone the teaching of production skills and production experience. Over the years, vocational and technical teachers’ colleges have played an important backbone and exemplary role in training secondary vocational teachers. It has its own advantages and characteristics—normal education, which is an advantage that other colleges and universities do not have. It is also fundamentally different from ordinary normal colleges and universities. Therefore, the selection of “double-qualified” teachers in vocational schools should give priority to the selection of professional and technical personnel with good professional skills and systematic education, so as to ensure the overall educational quality of “double-qualified” teachers. Students’ academic performance and learning performance are important factors reflecting teachers’ technicality. They cultivate “double-qualified” teachers’ integrating theory and practice and are an important symbol of the characteristics and level of vocational and technical normal colleges [9–11]. Although China’s education reform has been reformed for many years, the current teacher title and position in China is still a lifelong system, which is a management system without competition, elimination, and incentive. Over the years, vocational and technical normal universities have actively explored effective ways to cultivate “double-qualified” talents, made unremitting efforts in the combination of normal and technical, and achieved certain results. Academic vocational schools attach great importance to scientific research. While conducting basic theoretical research and applied research, they also attach great importance to educational scientific research. Reversal classroom is a prominent representative of change teaching. By strengthening the discipline construction of existing normal education and the academic level of other disciplines other than educational science, we can improve the academic nature of normal education and the competitiveness of talent training [12, 13]. As a vocational school, the personnel system is even more solid. Perhaps, only by completing change to upgrade the opposition component, for example, laying out the last end framework, constructing a logical evaluation file framework, and moving and redirecting educators who are not capable for proficient instructing.
might we, at any point, introduce the spring of the energetic improvement of vocational school training. Great schools advocate culture, regard culture, spread culture, and lay out a decent culture situated climate are a significant other-worldly power to urge educators to change into "double-qualified" instructors. Continuously deepen the advantages of teacher training from the perspective of specialty setting and curriculum system, as shown in Figure 3:

According to Figure 3, the advantages of teacher training in vocational schools include educational resources, geographical advantages, enterprise cooperation advantages, environmental advantages, and students' professional basic knowledge advantages. From the necessities of the fast improvement of vocational schooling on the number and nature of educators, there is an enormous advancement space in vocational and specialized educators' universities. According to the classroom demand, we should reasonably set up teaching problems and actively develop the majors urgently needed in secondary vocational education [14, 15]. The whole staff of the school should establish the thought of "teacher-oriented," care about teachers' work and life, and provide guarantee for teachers' growth, development, and improvement. The school has incorporated the construction of "double-qualified" teachers into the overall plan of school education development, established a continuing education and training system, formulated specific training plans according to teachers' age, education background, and experience, and implemented on-the-job rotation training for in-service teachers in vocational colleges and schools with new knowledge, new technology, and new methods as the main content. We should also create a fair and just environment within the school. In the evaluation of educators' work execution, in the evaluation of "double-qualified" educators' quality, and in the evaluation and advancement of instructors' expert titles and pay, we should assess impartially, extensively, and reasonably to tackle all uncalled-for issues inside the school. Third, accurately handle the connection among formal and casual associations. Give full play to the positive job of formal and casual associations to advance the inside and out improvement of instructors. In light of this, complete the means of streamlining the educator determination component of vocational schools.

2.3. ID3 Algorithm to Develop Teacher Evaluation Standards. ID3 algorithm plays a very important role in data mining. The ID3 approach, however, has certain drawbacks in practice, such as the inability to handle continuous characteristics and a preference for choosing attributes with higher values when computing information gain. The "information entropy" at the heart of the ID3 method is a well-known decision tree classification and prediction technique [16, 17]. ID3 choice tree algorithm data hypothesis is a hypothesis laid out to tackle the issue of data move (correspondence) process, otherwise called measurable correspondence hypothesis [18]. ID3 choice tree algorithm takes on voracious method to develop in a hierarchical recursive manner. By working out the data gain of each trait, the property with the most elevated data gain is chosen as the characterization standard for each segment, and this cycle is rehashed until the end condition is fulfilled to produce an order choice tree. The mathematical expectation expression formula of information entropy is as follows:

$$E(ε) = -ε(P ∩ Q).$$

In formula (1), $ε$ represents the established probability, $P$ represents the amount of event information, and $Q$ represents the amount of self-information. On the basis of formula (1), the expression formula of conditional entropy is obtained:

$$L = \frac{1}{φ} \sum (P|Q).$$

In formula (2), $φ$ represents the random variable and the other variables have the same meaning as formula (1). In the process of decision tree learning, we start to build a decision tree. We do not know how to classify instances according to attributes at the beginning. What we need to do is to construct a decision tree according to the training instance set to predict how to divide the entire instance space according to attributes. Then the expression formula of the probability that the training instance belongs to a certain category is

$$D(α) = \frac{α}{|H|}.$$

In formula (3), $α$ represents the number of training instances and $|H|$ represents the number of training instances.
At this point, the calculation formula of uncertainty degree of decision tree pair partition is as follows:

\[ H(a, e) = -\sum a \log_2(1 - e). \]  

(4)

In formula (4), \( e \) represents the attribute of training instance and \( a \) has the same meaning as formula (3). A framework for communicating data is made out of a shipper (source) and a recipient (objective) and a channel interfacing the two (channel). To minimize the amount of data required for the order of the preparatory test subset collected after parceling, the feature with the most notable data gain was selected as the test quality of the continuing hub. That is to say, the ID3 decision tree algorithm uses this attribute to divide the current (node contained) sample set. This limits the "different classification blending" of the different book sets delivered. Data hypothesis sees correspondence as the most common way of sending data in a climate of arbitrary impedance. In this correspondence model, both data sources and aggravations (commotion) are perceived as an irregular cycle or grouping of some sort or another. Accordingly, before the ID3 choice tree algorithm does the genuine correspondence, it is unimaginable for the collector (have) to know precisely the exact thing in a sort of unambiguous data the source will send and to decide what express the source will be in. Vocational instruction has its own conspicuous characteristics. Whether it is instruction mode or schooling objective, vocational training is altogether different from standard undergraduate universities and colleges, which requires the articulation recipe of vocational training to mirror the general data:

\[ V = \frac{\sum \phi}{\varphi |g - 1|}. \]  

(5)

In formula (5), \( \varphi \) represents the mean value of random variables and \( g \) represents the standard deviation of variables. The calculation results of formula (5) are standardized:

\[ G = \frac{\eta - 1}{\sqrt{\eta^2}}. \]  

(6)

In formula (6), \( \eta \) represents the constraint condition of principal component analysis. Astounding quality is one of the evaluation rules for the development of "double-qualified" educators in vocational universities. However, in terms of the current situation, many vocational colleges only choose and evaluate teachers from the professional title of teachers and put the theoretical teaching level of teachers in a key position, which is obviously unreasonable. Some of the main causes are problems of perception, perception level and structure. In terms of cognition, most leaders and teachers of vocational colleges (one-sided) think that "double-qualified" teachers are double-certified teachers with high academic qualifications and professional titles. Vocational education emphasizes learning for application, and practical operation skills should be the key content. Therefore, there is as yet an absence of vocational schooling educator quality evaluation framework in vocational universities. As far as license, most vocational schools and colleges trust that, for however long, there is an expert expertise testament; it is a "double-qualified" instructor. The issue is that the vocational expertise endorsement assessment coordinated by the HR and work security division is not of many sorts and the trouble is low, and various "double-qualified" instructors with vocational ability declarations are not deserving of the name. To guarantee the logical improvement of vocational schooling, the Ministry of Education has made a ton of plans and arrangements for showing execution evaluation [19–21]. The principal items in the plan are as per the following: in the new evaluation plan of vocational schooling educators, it is specified that higher vocational educators’ endorsements of cutting edge abilities and scholastic capabilities ought to be similarly thought of. In the development of "double-qualified" educators in vocational universities, the blend of claim to fame and specialty is stressed, which is the emotional need to tackle the issue of lacking number of vocational training instructors (particularly educators of famous specific courses) in vocational schools, and the objective necessity of common shared benefit between vocational schooling and nearby monetary development. The professional title evaluation of higher vocational teachers should be assessed according to specific professional categories, and the jury should choose those who understand vocational education and have rich experience. Teachers in vocational colleges can take the corresponding professional title examination according to their actual situation. After obtaining the professional title, teachers are the same as ordinary teachers in terms of treatment and status. Vocational college part-time teachers from industry, enterprise the first line, can put the industrial enterprises of advanced enterprise culture, technology, production experience, and professional posttechnology into the classroom, to promote vocational education and industry, organic combination of industry, promote the seamless joint between classroom teaching and job skills training, and can also promote the full-time and part-time teachers of technical communication in order to work on the nature of preparing ability in vocational schools. These new schemes for professional title assessment of vocational education teachers can be used as a reference for higher vocational education. Based on the above description, the steps of formulating teacher evaluation standards were completed.

2.4. Designing the Evaluation Model of Faculty Construction. The evaluation of teacher team construction has been a well-known keyword in the teaching field. Moreover, many
experts and scholars at home and abroad have systematically analyzed and studied it. The weight of indicators in the objective weighting evaluation method is provided by objective information. Specialist test system is applied to educating, and evaluation is completed in mix with the free factor normalized fractional relapse coefficient of different direct relapse examination, head part investigation, and list commitment pace of variable investigation [22, 23]. The evaluation of showing staff development fundamentally includes three viewpoints: instructors’ instructing, understudies’ learning, and the last quality and impact of study hall educating. The subjective weight evaluation method is simple, but its disadvantage is too strong artificial factor. In the evaluation mode, the teacher performance evaluation system is introduced, as shown in Figure 4:

As can be seen from Figure 4, the teacher performance evaluation system mainly includes three aspects: evaluation index, evaluation method, and evaluation result quantification. The evaluation of teaching staff construction is a measure of the gap between the actual teaching effect and the required goal. Objective of the disadvantages of empowerment evaluation method is too dependent on statistical or mathematical quantitative methods and neglect the importance of the evaluation index itself, completely depend on the sample data, when sample data changes, weight will also change, from the statistical rule, with the increase of sample size, the change of weight should be smaller and smaller, finally tends to a stable value. Assuming that there are several evaluation variables, the expression formula of eigenvalues of the related coefficient matrix is as follows:

$$Y = \frac{y \sum (M - 1)}{M}.$$  \hspace{1cm} (7)

In formula (7), \(y\) represents rotation factor and \(M\) represents factor load array. And according to Formula (7), the expression formula of the estimator of commonness is

$$k = \sum_{j=1}^{i} s_{ij} (1 - z).$$  \hspace{1cm} (8)

In formula (8), \(z\) represents the number of principal components, \(s\) represents the corresponding feature vector, and \(i, j\) represents the original vector and standardized vector, respectively. The calculation results of formula (7) and formula (8) are the key to grasp the connotation and the essence of the evaluation of teacher team construction. However, in our actual evaluation process, it is impossible to make the sample number large enough, so we still need to regard the whole evaluation system as an uncertain system and use the known information to excavate the rules of the system to the maximum, so we still need to get approximate values under the limited samples. Therefore, we can say that the evaluation of teacher team construction is the evaluation of relevant factors in classroom teaching based on a certain evaluation purpose. Evaluators can be the subjects, teachers and students in classroom teaching, as well as educational staff engaged in teaching work or experts in specialized fields. Therefore, the combination of subjective and objective evaluation is adopted to combine subjective and objective evaluation and achieve more scientific and reasonable evaluation results by complementing their advantages. They evaluate the value and effect of teaching work from different angles, so as to improve themselves or promote the efficacy of teaching. Therefore, this paper believes that the evaluation of teacher team construction is a process in which different evaluators evaluate the actual situation of classroom

| Number of experiments | Evaluation method for the construction of double-qualified teachers in vocational schools based on association rules | Evaluation method of double-qualified teachers’ team construction in vocational schools based on data mining | The evaluation method of double-qualified teachers’ team construction in vocational schools based on association rules is proposed in this paper |
|-----------------------|-------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|
| 1                     | 78.615                                                                                                | 70.598                                                                                                | 85.669                                                                                                |
| 2                     | 69.115                                                                                                | 71.262                                                                                                | 84.351                                                                                                |
| 3                     | 72.362                                                                                                | 69.847                                                                                                | 82.007                                                                                                |
| 4                     | 68.446                                                                                                | 75.468                                                                                                | 83.149                                                                                                |

| Number of experiments | Evaluation method for the construction of double-qualified teachers in vocational schools based on association rules | Evaluation method of double-qualified teachers’ team construction in vocational schools based on data mining | The evaluation method of double-qualified teachers’ team construction in vocational schools based on association rules is proposed in this paper |
|-----------------------|-------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|
| 1                     | 69.585                                                                                                | 68.419                                                                                                | 75.619                                                                                                |
| 2                     | 63.484                                                                                                | 65.487                                                                                                | 74.802                                                                                                |
| 3                     | 56.119                                                                                                | 59.306                                                                                                | 76.329                                                                                                |
| 4                     | 67.302                                                                                                | 62.574                                                                                                | 76.810                                                                                                |
teaching according to different purposes, and then improve the teaching effect. The evaluation of teacher team construction has the characteristics of pluralism of evaluation subject, certainty of evaluation purpose, multiplicity of evaluation criteria, and diversity of the evaluation methods. Based on this, the steps of designing the evaluation mode of teacher team construction are completed.

3. Experimental Analysis

In the evaluation of the construction of double-qualified teachers in vocational schools, continuous values are obtained, which is not conducive to analysis. Selection based on association rule double type teaching staff construction of the vocational school evaluation method, based on data mining of vocational school evaluation method of double type teaching staff construction, and the text of the vocational school based on association rules of the evaluation method of double type teaching staff construction, experimental comparison, were measured under the condition of different degree of confidence, three methods of evaluation of accuracy, Tables 1–4 shows the experimental results:

As should be visible from Table 1, the normal exactness of the evaluation method for the development of double-qualified educators in vocational schools in light of affiliation rules and the other two evaluation methods are 83.794%, 72.135%, and 71.794% separately. As should be visible from Table 2, the normal exactness of the affiliation rules-based evaluation method for the development of double-qualified educators in vocational schools is 75.890%, 64.123%, and 63.947%, separately, contrasted and the other two evaluation methods. As should be visible from Table 3, the normal precision of the affiliation rules-based evaluation method for the development of double-qualified educators in vocational schools is 63.617%, 52.834%, and 53.403%, separately, contrasted and the other two evaluation methods. As should be visible from Table 4, the normal exactness of the evaluation method for the development of double-qualified educators in vocational schools in light of affiliation rules and the other two evaluation methods are 56.534%, 46.311%, and 45.832% separately. The evaluation method for the development of double-qualified educators in vocational schools in the text has higher precision.

4. Conclusion

This paper centers on investigating the prevailing situation in the development of double-qualified educators in vocational universities from the full scale level and depicts the act of vocational schools in advancing the development of school-endavor joint development of vocational training educators. Joined with the application characteristics of the ID3 algorithm, the plan of evaluation method for the development of double-qualified educators in vocational schools is understood. In the future, more investigations and studies on grassroots practice are needed, so as to better identify problems, sum up experience, and provide a more scientific reference basis for decision-making.

Data Availability

The data used to support the findings of this study are included within the article.

Conflicts of Interest

The authors declare that they have no conflicts of interest.
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