Adult and Higher Education (2023)
Clausius Scientific Press, Canada

DOI: 10.23977/aduhe.2023.051107
ISSN 2523-5826 Vol. 5 Num. 11

Current Situation and Construction of Innovation Mechanism of School-enterprise Cooperation and Collaborative Education in Higher Vocational Education Based on Machine Learning

Jinxiu Shao, Chao Gao, Lin Zhou

Lianyungang Open University, Lianyungang, Jiangsu, 222002, China

Keywords: School-enterprise Cooperation, Machine Learning, Decision Tree, Innovation Mechanism

Abstract: As a new model of talent training, school-enterprise cooperation education must continue to innovate and explore to promote its sustainable development. The main purpose of this paper was to explore how to use machine learning (ML) to analyze and study the mechanism of school-enterprise cooperation and the current development of school-enterprise cooperation. Aiming at the problem of school-enterprise cooperation mechanism, a school-enterprise cooperation model based on decision tree (DT) has been proposed. The related algorithms have been discussed in detail. Combined with the school-enterprise cooperation mode of higher vocational colleges in Z city, the case design and analysis were carried out. It can be seen from the questionnaire that 60.00% of the companies chose to "select new employees". 55.85% of the schools rated the school-enterprise cooperation as "average cooperation effect". It can be seen that the current school-enterprise cooperation in Z city is too simple. The level of cooperation is not high. In terms of the content of cooperation, the school has established its own professional direction according to the requirements of the enterprise, which can pave the way for the employment of school graduates. This "cooperation-employment" management model is too simple. It lacks systematic planning and lacks national policy support and assurance. On the other hand, due to the different cognitions between schools and enterprises, different departments, classes, teachers, and students also have different views. This makes it impossible to establish a flexible and effective mechanism between schools and enterprises. It also makes the students of the same major and different classes have great differences in the practical operation ability in practical application.

1. Introduction

China's economy has grown quickly, and its far reaching public strength has been consistently improved. The modern construction has been improved from extensive development to intensive development. The cultivation of high-quality talents has turned into the agreement of legislatures and social orders all over the planet to develop excellent and exceptionally abilities. Professional training is a significant piece of higher vocational instruction. "School-enterprise Cooperation" is an inescapable decision for the advancement of higher vocational education. The key to improving the quality of higher vocational education is to strengthen the connotation development of higher vocational education. Higher professional universities ought to fortify close participation with enterprises, society and industries. Likewise, it should try to produce top-notch, highly gifted people for the business in the areas of government, society, business power, and speculation.

School-enterprise collaboration is of incredible key importance to China's assembling industry. Bian F concentrated on another school-enterprise collaboration instrument in light of a better choice tree calculation. To make it easier to apply the engagement system to rehearsals, a hybrid preparation base, both online and disconnected, has been established, which hopefully led to closer collaboration between schools [1]. In view of the production and cultivation reconciliation, Zhang J illustrated the substance of school-enterprise participation. He additionally investigated and considered the collaboration among schools and endeavors in higher professional universities [2]. Li C concentrated on the effect of instruction change on the schooling business. According to this point of view, the new model of school-endeavor collaboration in higher professional universities was built [3]. To direct a more profound exploration on the school-undertaking participation model, Pang X drew on the experience of the "double first-class" school-enterprise cooperation model to construct another model [4]. However, these studies have not yet analyzed the innovation mechanism based on the status quo.

ML keeps on releasing its power in an extensive variety of applications. Buczak A’s report portrayed an engaged writing review of ML and information mining strategies for network examination on the side of interruption discovery. He also gave short instructional exercise depictions of every ML and information mining strategy [5]. Zhou L presented the Machine Learning Framework for Big Data to direct the conversation of its chances and difficulties. The different periods of ML and the parts of Machine Learning Framework for Big Data gave a guidance for distinguishing significant open doors and difficulties, which opened up future work in numerous neglected or neglected research regions [6]. Coley C W detailed a model system for anticipating reaction results. This system consolidated the customary utilization of responsive formats with the adaptability of example acknowledgment given by brain networks [7]. Hu X fostered a high level condition-of-charge assessor through AI strategies for solid battery the executives in electric vehicles (EVs) [8]. Lamperti F unequivocally resolved the issue of boundary space investigation and adjustment of specialist based models by joining AI and savvy iterative inspecting [9]. However, these algorithms have low performance and limited application scope.

During the time spent school-venture participation, Businesses give monetary, hardware, and specialized help. In any case, the advantages got are far more modest than anticipated, which further debilitates the excitement of endeavors for school-venture participation. It makes it challenging to keep up with the agreeable connection among schools and undertakings. The option to form showing plans is still in the school. There is as yet a major hole between showing practice and occupation necessities. The detailing of instructive plans and the prerequisites of undertakings for abilities are likewise altogether different. The development of this paper is that the DT calculation is joined with the school-endeavor participation instrument to build a school-venture collaboration system in light of DT. Simultaneously, this paper additionally examined the school-endeavor collaboration status of higher professional universities in Z city.

2. School-enterprise Cooperation Mechanism Method Based on Decision Tree

2.1. Machine Learning

ML is currently the fastest-growing discipline in artificial intelligence technology. Its advantages such as low cost, high efficiency, short cycle, and wide scale have attracted widespread attention compared with "trial and error". In traditional computing, a computer is just a computing tool designed by human experts. In ML, as long as there are sufficient data and relevant rule operations, the computer can make judgments or predictions on known or unknown situations according to the laws of the data [10-11]. Simply speaking, ML is about how to make a machine "think and learn" like a human, which is fundamentally different from a machine working according to a human's specialized programs. The overall process of ML is shown in Figure 1.

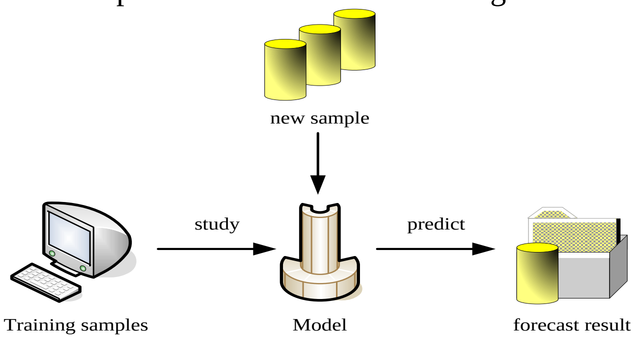


Figure 1: General flow of ML

There are many kinds of ML algorithms. The more commonly used ones are shown in Figure 2.

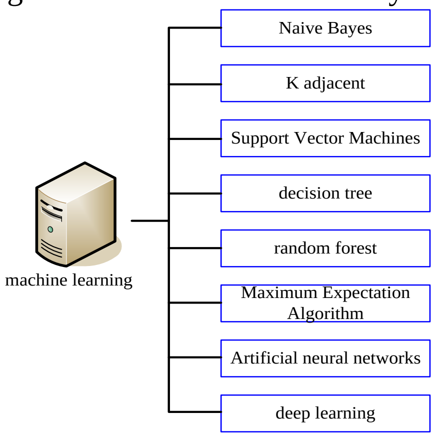


Figure 2: ML common algorithms

DT is the probability of occurrence based on known conditions. Using the DT method, the project risk is assessed. As can be seen from Figure 3, DT determines the feasibility of the sample. It is to express probability analysis with graphics and solve it with graphics. The continuous branching process in this decision is depicted as a tree very similar to a growing tree, so this method is called DT [12-13].

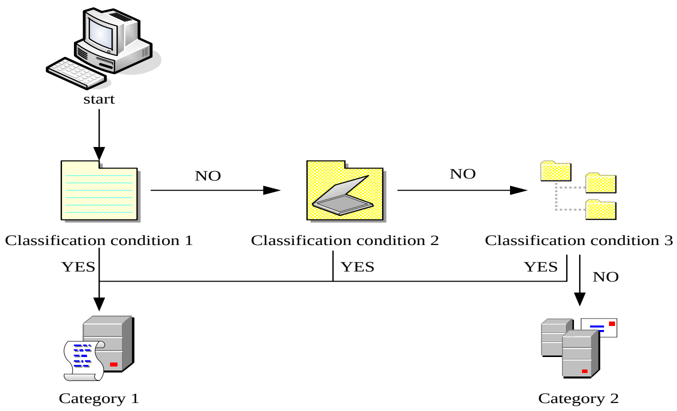


Figure 3: Basic model of DT

The essence of the DT algorithm is to first select the optimal branch attribute, and then divide it into the best points. The above steps are repeated until the end condition of the algorithm is reached [14]. This paper makes a detailed analysis of the common DT algorithms of ID3 and C4.5.

2.2. Decision Number Algorithm

(1) ID3 algorithm

ID3 algorithm is a DT learning method based on information entropy. Using information entropy as a criterion, the training sample base is classified and a DT is constructed to predict how this test attribute splits the entire sample space. The ID3 algorithm determines the splitting characteristics of nodes through the calculation of data entropy, thereby realizing the growth of branches [15].

Before introducing the ID3 algorithm, two concepts are first introduced.

Definition of self-information quantity: Assuming that c_1, c_2, ..., c_m are the signals sent by a source, the uncertainty sent by the receiver before receiving is defined as:

$$O(c_o) = -\log A(c_o) \tag{1}$$

The definition of information entropy: The amount of self-information can reflect the uncertainty of the symbol, while the information entropy measures the uncertainty of the entire source.

$$\begin{aligned} J(C) &= A(c_1)O(c_1) + A(c_2)O(c_2) + ... + A(c_m)O(c_m) \\ &= -\sum_{o=1}^{m} A(c_o) \cdot \log A(c_o) \end{aligned} \tag{2}$$

$A(c_o)$ is the likelihood that the source can signal.

In view of the key technology of DT algorithm is the selection of branch attributes and the selection of segmentation nodes [16], this paper briefly introduces the feature selection and node selection of ID3.

After the collection is defined, the following specification is introduced. The training sample set is called D, so that it is divided into m classes, denoted by $V = \{V_1, V_2, ..., V_M\}$. It is supposed that the number of training samples in level o is $|V_o|$, and the number of overall training samples in D is $|D|$. It is supposed that a sample belongs to class o with probability $A(V_o)$, then, there is $A(V_o) = |V_o| / |D|$. Assuming that the uncertainty of DT for partition V is $J(D)$, then from the definition of information entropy in information theory, it can be obtained:

$$J(D) = -\sum_{o=1}^{m} A(V_o) \cdot \log_2 A(V_o) \tag{3}$$

If S is chosen, then S has l different values: $b_1, b_2, ..., b_l$. Assuming that the number of samples for attribute $S = b_k$ is $|D_k|$ and the attribute is $S = b_k$, the probability of occurrence is:

$$A(b_k) = \frac{|D_k|}{S} \tag{4}$$

When attribute $S = b_k$, the number of samples belonging to class o is $|D_{ok}|$:

$$A(b_o|S=b_o)=\frac{|D_{ok}|}{|D|} \tag{5}$$

When the value of $A(b_o|S=b_o)$ test attribute S is b_k, it is the possibility of category o. At this time, the uncertainty of DT for classification refers to the state entropy of the training samples on the attribute S, that is:

$$J(D|S)=-\sum_{k=1}^{l}\sum_{o=1}^{m}a(b_k)A(V_o|b_o|S=b_o)\log_2 Ab_o|S=b_o) \tag{6}$$

From this, it follows that the amount of information provided by attribute S is:

$$O(D|S)=J(D)-J(D|S) \tag{7}$$

Then, the changes in the total amount of information when different attributes are selected are sequentially calculated. The attribute with the largest value is taken as the split node.

(2) C4.5 algorithm

In order to solve the problems existing in the ID3 algorithm, some scholars proposed the C4.5 algorithm on this basis. Among them, C4.5 modifies the segmentation options on the basis of ID3. A pruning algorithm for overfitting is added [17-18]. The following is the algorithm for C4.5.

Similar to the ID3 algorithm, the key to the C4.5 algorithm is how to select branch attributes and select the optimal split point. Both cases are described below. As before, this article starts with the definition of a set and gives a detailed introduction to the core of the algorithm.

It is supposed that Y is a dataset and the category set is $\{V_1,V_2,...,V_l\}$. An attribute B is chosen, and Y is divided into several subsets. B has m inconsistent values of $\{b_1,b_2,...,b_m\}$, then Y is divided into m subsets of $\{Y_1,Y_2,...,Y_m\}$. Among them, the value of the instance in Y_o is b_o. $|Y|$ is the number of instances in the dataset Y. $|Y_o|$ is the number of instances with $B=b_o$ in dataset Y. $|V_o|$ is the number of instances of V_o. $|V_{kb}|$ is the number of instances with class V_o out of $B=b_o$ instances. Then there are:

$$A(V_k)=\frac{|V_k|}{|Y|} \tag{8}$$

When $B=b_o$, there are:

$$A(b_o)=\frac{|Y_o|}{|Y|} \tag{9}$$

In $B=b_o$ cases, the odds of having category V_o are:

$$A(V_k|B=b_o)=\frac{|V_{kb}|}{|Y_o|} \tag{10}$$

Therefore, the category information entropy is expressed as:

$$O(V) = -\sum_{k=1}^{l} A(V_k)\log A(V_k) \tag{11}$$

The class conditional entropy is:

$$O(V|B) = -\sum_{k=1}^{l}\sum_{o}^{m} A(b_o)A(V_k|B=b_o)\log A(V_k|B=b_o) \tag{12}$$

The information gain is as follows:

$$gain(B) = O(V) - O(V|B) \tag{13}$$

The information entropy of attribute b is:

$$O(V) = -\sum_{o}^{m} A(b_o)\log A(b_o) \tag{14}$$

Then, the calculated information gain rate of attribute v is:

$$gain\_ratio = \frac{gain(B)}{O(B)} \tag{15}$$

Then, according to the maximum information gain rate, the maximum splitting point and splitting point are obtained.

Compared with the ID3 algorithm, C4.5 has added the processing of continuous attribute split points and attribute missing values.

Among them, the processing methods of continuous attribute split points are as follows:

A minimum continuous attribute is found and assigned to MIN. The minimum value of this connection is found and assigned to MAX.

The setting N equal breakpoints S_o in interval $[MIN, MAX]$ can be given by the following formula:

$$S_o = MIN + \frac{MAX - MIN}{MJ} \times o \tag{16}$$

Among them, $o = 1,2,..., M$.

The gain values when $[MIN, S_o]$ and $[S_o, MAX]$ are used as interval values are calculated and compared respectively.

The A with the largest gain value is selected as the split point of the continuous attribute, and the two intervals after splitting are $[MIN, S_o]$ and $(S_o, MAX]$.

Property missing values are handled as follows:

Since the training sample set may contain spaces for specific attributes, C4.5 sets weights for each sample size. Initially, each sample has a weight of 1. If the test attribute S is selected from the sample group Y, then Y is divided into d sub-sample groups $(Y_1, Y_2, ..., Y_d)$. For each subsample group Y_o, the sample group includes a sample group of $S = s_o$ and S value gaps in Y. The weight of gap samples in Y is proportional to the ratio of the number of gap samples for S values in Y to the number of samples in Y for which S values are not null.

Another innovation of C4.5 is to use iterative operations to find the branch error rate of the target node, thereby obtaining its error rate. For example, for a leaf node with M instances and R errors (that is, the classification it belongs to does not match the classification predicted by this leaf node), first, the pessimistic pruning method ratio of $(R+0.5)/M$ is used to judge its empirical error. Assuming that a subtree has Z leaf nodes with $\sum R$ errors and $\sum M$ instances, the bit error rate of this subtree can be estimated by $(\sum R+0.5\cdot Z)/\sum R$. Given that this subtree is replaced by its leaf nodes, K misclassifications are obtained in the training dataset. If $(K+0.5)$ is within 1 standard deviation of $(\sum R+0.5\cdot Z)/\sum R$, the subtree is replaced by the leaf node of this subtree.

2.3. Establishment Method of School-enterprise Cooperation Mechanism

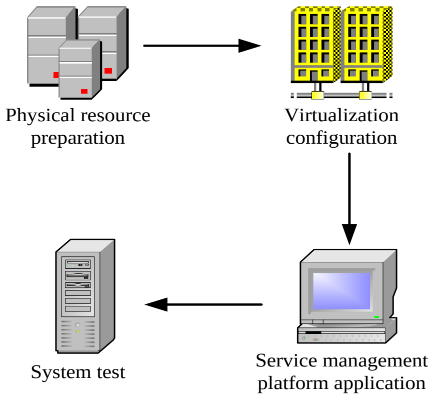


Figure 4: Platform implementation process

On this basis, there is no significant difference between the scheme based on DT algorithm and the conventional scheme in practical application. However, sufficient physical resources should be considered in practical applications. In view of the asset pool, dynamic asset arrangement can be performed for various clients. Along these lines, when a client makes a solicitation, regardless of which actual gadget is designated, the asset can be haphazardly separated from the asset pool [19-20]. Figure 4 shows the execution interaction of the training stage distributed computing arrangement.

When classifying resource pools, it is necessary to try to group all resources into the same resource pool. Because enterprises and schools have greater demand for digital resources, cloud computing adopts a safe isolation method when using specialized hardware devices. In order to ensure the security of enterprise users on the cloud, each local area network has its own resource library.

The double-loop connection refers to the integration of resources between universities and enterprises to achieve effective management and use. Knowledge sharing is a prerequisite for knowledge sharing. Only in two different teaching modes can the needs of students be met to the greatest extent.

University education pays attention to the practical ability of students, which is the main form of current school-enterprise cooperation. Under the current educational background, the talent training model can also blaze a new path. Using online education technology, online training is realized.

3. School-enterprise Cooperation Experiment of Higher Vocational Education in Z City

3.1. Development Status of Higher Vocational Colleges in Z City

Although China's vocational and technical education started relatively late, it has achieved remarkable results after a long period of development. Under the background of reform and opening up, Z city colleges and universities have developed rapidly. In the process of rapid development in China, Z city college has become an important demonstration base for China's colleges and universities. At present, college-enterprise cooperation in higher vocational colleges faces many problems. In particular, the enthusiasm of university-enterprise cooperation is low. The higher vocational colleges in the Z city have their own characteristics in this field. Therefore, research in this field must be strengthened.

After several years of development, by the end of 2021, China has a total of 48 higher vocational colleges. At present, there are more than 40,000 students and more than 150 majors. More than 80% are high-tech, compound, and three-industry majors, covering machinery, electronics, information, commerce, catering, tourism and other industries. It has formed a technical school education system covering all major economic departments in the city, with relatively complete professional categories and a basically reasonable layout. After years of development, Z city colleges and universities have achieved initial results in school-enterprise cooperation. The scale of running schools has continued to expand.

(1) The number of school-enterprise cooperation continues to expand

Table 1: Number of higher vocational school-enterprise cooperation in Z city

	Various professional school-enterprise cooperation units(homes)			
	1-3 homes	4-6 homes	7-10	10 or more
quantity	16	17	8	7
proportion	33.33%	35.42%	16.67%	14.58%

It can be seen from Table 1 that the current scope of school-enterprise cooperation in Z city is expanding. The number of partners is also increasing, including instruments, teaching, scientific research, technical services, etc. The cooperation model is mainly funded by the company. The company's production facilities are also available for student internships. However, schools should train professional and technical personnel for enterprises. With the reform of China and the economic development of Z city, the school-enterprise partnership in Z city has been further developed.

(2) The content of school-enterprise cooperation is gradually enriched

The school-enterprise cooperation of regional colleges in Z city has shown the characteristics of diversified development. School-enterprise cooperation is not only material cooperation, but also spiritual cooperation. There are various forms of cooperation in manpower, material resources, funds and other aspects of training for college students, such as hiring senior technicians as school teachers. Collaboration in spirit is the recognition of company and school culture. Table 2 shows the cooperation between vocational colleges and enterprises in Z city.

Table 2: Fields of higher vocational school-enterprise cooperation in Z city

	Number of vocational colleges	proportion
Running a school and educating people	45	93.75%
Technology research and development and service	5	10.42%
social service	8	16.67%
other	7	14.58%

3.2. Investigation on the Current Situation of School-enterprise Cooperation in Higher Vocational Colleges in Z City

The goal of school-enterprise cooperation is to cultivate high-quality talents, which is also an important factor restricting the relationship between enterprises and the market. The success of school-enterprise cooperation is directly related to the degree of recognition of the cooperation between the two parties. The survey took the principals and teachers participating in school-enterprise cooperation of 6 higher vocational schools of the same level in Z city as the research objects.

3.2.1. Research on the company

In the process of investigation, various investigations were carried out from the aspects of enterprises' demand for talents, expectations of talents' quality, and acceptance of school-enterprise cooperation. Twenty companies were surveyed (each company included 1 executive). A total of 110 enterprise questionnaires were distributed, and 100 valid questionnaires were returned.

1) Table 3 is the survey and analysis of the labor demand of local enterprises in Z city.

Table 3: Enterprise employment requirements

	frequency	proportion
Practical	12	60.00%
scientific research	2	10.00%
Compound	4	20.00%
ordinary worker	1	5.00%
other	1	5.00%

As can be seen from Table 3, among the corporate executives who participated in the survey, 20 executives participated in online voting. For an urgent need of "practical" talents, 12 enterprise managers voted it, accounting for 60.00%. For a need for "compound" talents, a total of 4 voted it, accounting for 20.00% of the total number. The "scientific research" category had two votes, accounting for 10.00% of the total number. Ordinary workers had 1 vote, and the total number was 5.00%. It can be seen from the above data that what Z enterprises lack most now is "practical" talents. Higher vocational schools in Z city need to reform the teaching based on the employment needs of local enterprises in Z city, so as to improve students' practical ability and improve their learning time skills.

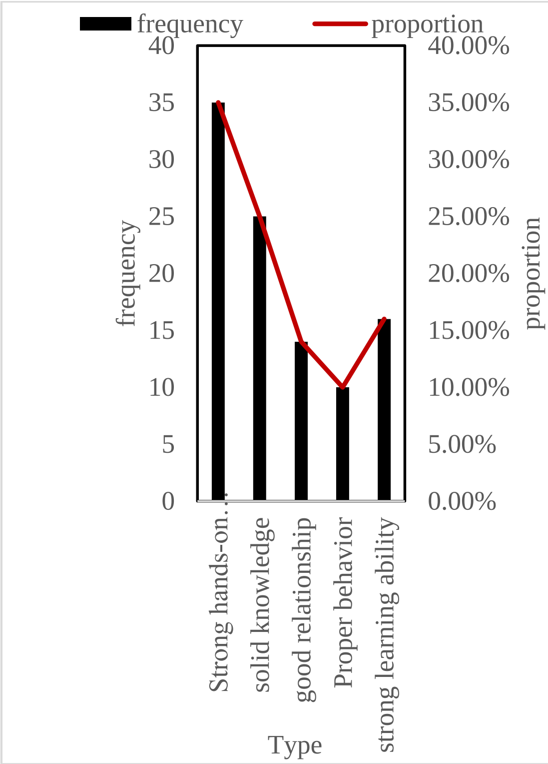
2) Relevant research of some enterprises

Figure 5 presents some of the data about the business survey. Figure 5(a) is a survey of local companies in Z city on the basic quality of their employees. Figure 5(b) is a survey of the reasons why companies in Z city accept the internship of school-enterprise cooperation students. Figure 5(c) is a survey of the degree of recognition of cooperative education between universities and enterprises.

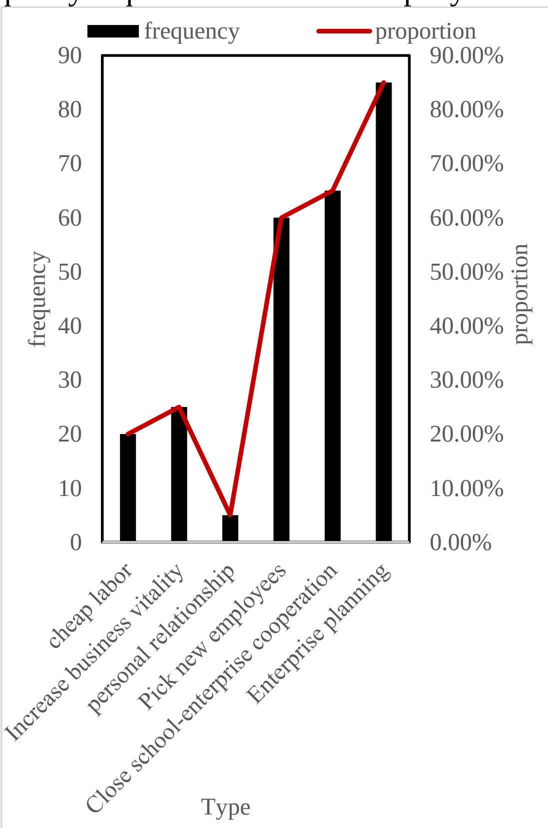
As shown in Figure 5(a), among the quality requirements for employees of the surveyed managers, "strong hands-on ability" accounted for 35.00%, while "solid knowledge" accounted for 25.00%. 16.00% were required to have strong learning ability, and 14.00% of company managers needed to have good interpersonal relationships. The study found that the interviewed enterprises were paying more and more attention to the production technology of talents, which pointed out the direction for the development of higher vocational education in Z city.

Figure 5(b) shows that 85.00% of business managers believed that the cooperative relationship with the school was an important part of the company's long-term development. 65.00% of business managers believed that school-enterprise cooperation made the school-enterprise relationship closer. 60.00% of business managers believed that school-enterprise cooperation could cultivate better talents. Personal connections and cheap labor were less likely to be used. This also shows that most companies choose long-term cooperation with vocational colleges for long-term consideration.

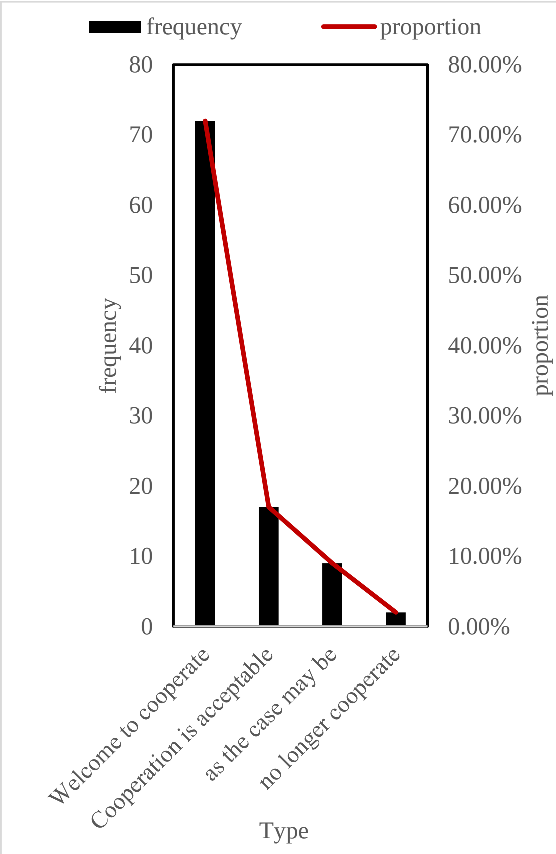
In the survey in Figure 5(c), 72.00% of enterprise managers indicated that they highly recognized the students trained by the school-enterprise cooperation for internships or jobs in the enterprise. No matter from production positions or practical operation, enterprise managers were quite satisfied with these students.



(a) The quality requirements of the company for employees



(b) The reason why the company accepts students from school-enterprise cooperation



(c) Recognition of the school-enterprise cooperation by the enterprise

Figure 5: Some related surveys of enterprises

3.2.2. Research on schools

A survey was conducted on teachers of 6 equivalent vocational schools in Z city. A total of 200 school questionnaires were distributed, and 188 valid questionnaires were recovered. The result is:

1) Figure 6 is a survey of the reasons for the obstacles that schools believe to carry out school-enterprise cooperation.

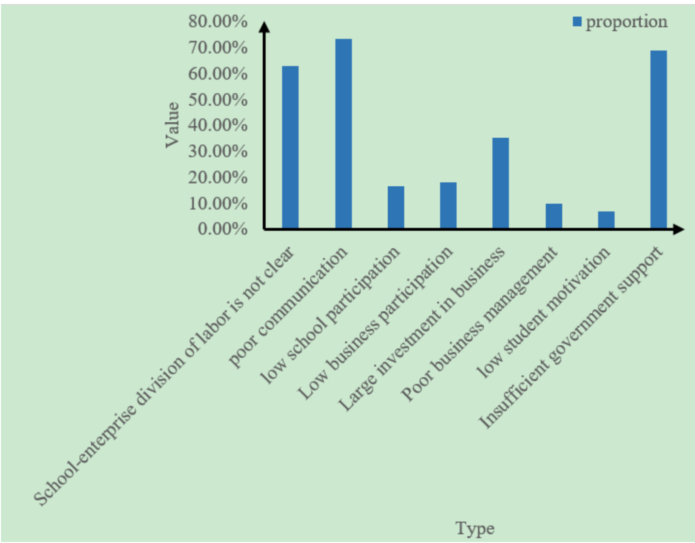
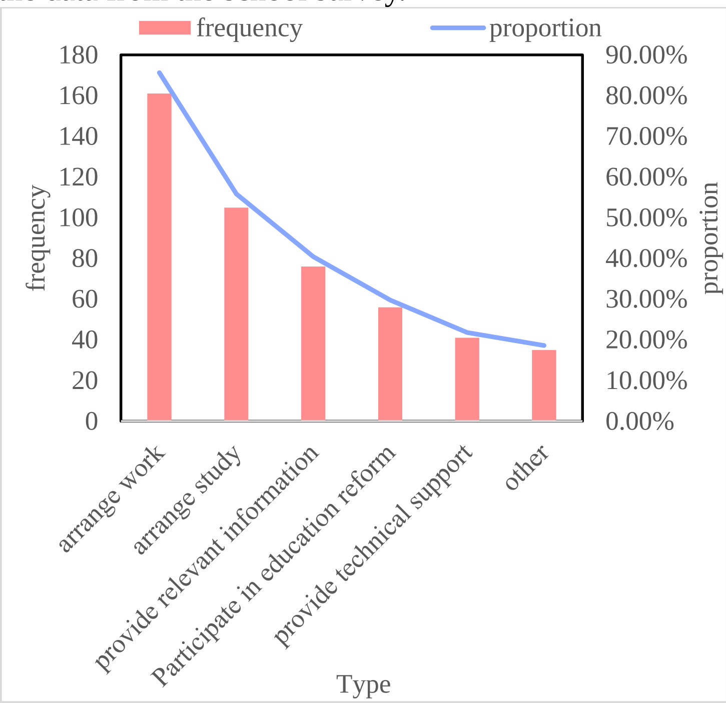


Figure 6: Analysis of obstacles to school-enterprise cooperation

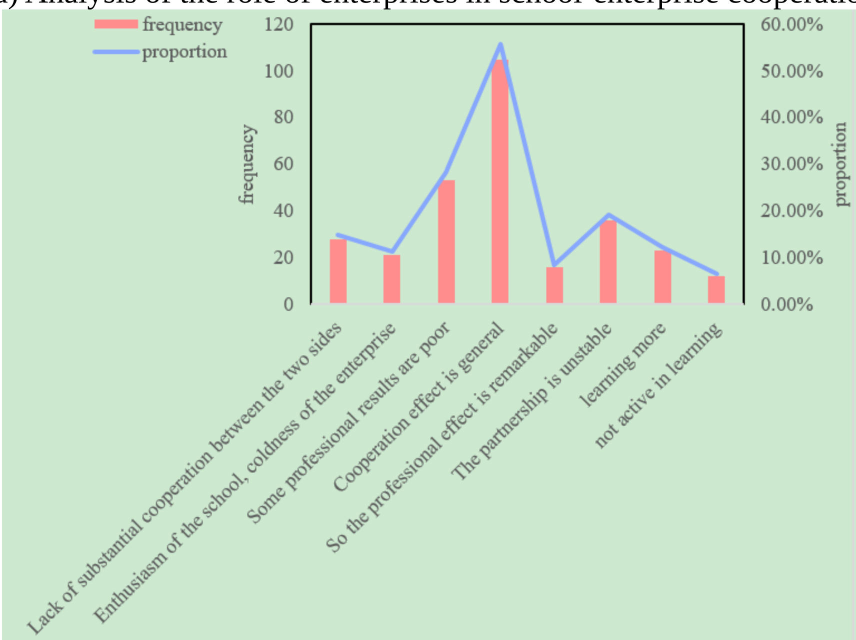
The study found that there are three main obstacles to the cooperation between Chinese universities and enterprises at present. First, the problem of the communication mechanism between universities and enterprises has caused the communication to be unsmooth (73.40%). Secondly, the support and preferential treatment provided by the government is insufficient (68.62%). The third problem is that the division of work between the two parties is not clear and the responsibilities are unclear (62.77%). Therefore, only by thoroughly solving these three problems can the cooperation between schools and enterprises be more in-depth and lasting.

2) Relevant research on some schools

Figure 7 is part of the data from the school survey.



(a) Analysis of the role of enterprises in school-enterprise cooperation



(b) The school's evaluation of the current state of school-enterprise cooperation

Figure 7: Part of the school's related research

As can be seen from Figure 7(a), the school-enterprise cooperation in Z city is mainly reflected in the current school-enterprise cooperation in the students' academic (85.64%) and work arrangements (55.85%). Compared with school-enterprise cooperation in other countries, the school-enterprise cooperation in Z city is still in its infancy.

In Figure 7(b), 55.85% of the students believed that "the collaboration between schools and enterprises is average". There were 28.19% of students who think that "the effect of some majors is poor". There were also 19.15% who think "cooperative relationship is unstable". 14.89% of the people thought "lack of substantial cooperation".

In short, the current world economy is in a downturn. To promote cooperation between schools and enterprises, Z city must share resources, form complementary advantages and develop together. Enterprises can provide enterprises with practical operation ability, high-quality, high-quality fresh graduates by providing practice bases, capital construction laboratories, technical support, etc., so as to enrich the company's talent team and enhance the competitiveness of enterprises. On the other hand, the cost of running a school can be effectively reduced through corporate funding. The current shortage of vocational skills and funds is solved, and the practical ability of teachers is improved. This promotes the reform of the school and improves the overall strength of the school, which lays the foundation for the graduates' graduation work. The cooperation between schools and enterprises is a win-win situation. However, if separated, there would be a lose-lose situation.

3.3. Problems and Suggestions

Taking 6 higher vocational colleges in Z city as examples, this paper conducts research in combination with multiple colleges and universities. It draws the best way to target higher vocational colleges with the goal of cultivating practical technical talents, which requires the strong support and cooperation of the government, schools and society. However, in fact, this is a very difficult thing. Due to various reasons, the government, society and other parties have insufficient investment in school-enterprise cooperation, resulting in the slowness of school-enterprise cooperation. The problems that arise are summarized in Figure 8.

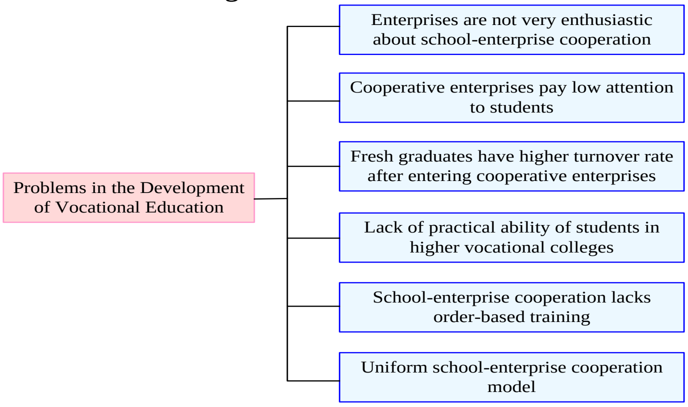


Figure 8: Problems in the development of vocational education

In higher vocational education, schools and enterprises also have many problems. These problems are related to the teaching quality of schools and economic development. To solve this problem, the state, schools and enterprises need to work together and take corresponding countermeasures. At the national level, to strengthen the cooperation between schools and enterprises, there must be policy support. Therefore, the applied education should be paid attention to. Schools should provide high-quality human resources for enterprises, and enterprises should strengthen their own development. The end result of this collaboration can be reflected in the company's innovation results. This paper explores the scientific and effective way of vocational education school-enterprise cooperation through the case analysis of Z city higher vocational colleges. Among them, the government plays a leading role in stimulating the enthusiasm of schools and enterprises to form a long-term cooperative relationship. This cooperation depends not only on market regulation, but also on the support of corresponding policies and regulations, in order to continue to innovate and develop. Figure 9 gives specific recommendations.

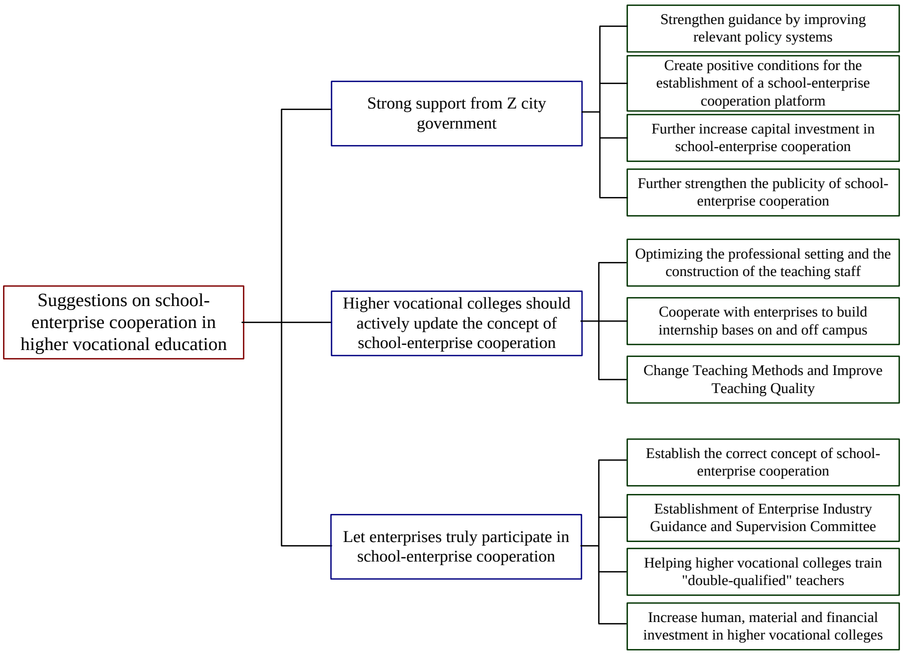


Figure 9: Suggestions for school-enterprise cooperation in higher vocational education

4. Conclusions

The cooperation between China's higher vocational colleges and enterprises is not only the requirement for super-senior talents in today's society, but also the need for the sustainable development of higher vocational colleges and the cause itself. So far, China's higher vocational schools are dealing with many problems that cannot be adapted to the development of business. Thus, in order to understand "school-enterprise cooperation", it is necessary to study another school-running model based on the mix of higher vocational training and education. In this paper, the school-enterprise cooperation mechanism has been designed according to the decision tree. The status quo of entrepreneurial participation in some higher vocational colleges in Z city has been analyzed. Considering the influencing factors from various angles, by examining the importance and existing problems of school-enterprise cooperation, how to achieve mutual benefit and win-win has been discussed, which provides a reference for the development of higher vocational colleges and enterprises.

Acknowledgment

Research topic of vocational education reform in Jiangsu Province, subject name: Research on craftsman spirit cultivation of Jiangsu vocational students under job dilemma, project number: ZYB267; Jiangsu Education Science "14th Five-Year Plan" project, project name: Research on teacher role remodeling of higher vocational colleges under the background of "China Manufacturing 2025", project number: B / 2021 / 03 / 05.

References

[1] Bian F, Wang X. School enterprise cooperation mechanism based on improved decision tree algorithm[J]. Journal of Intelligent and Fuzzy Systems, 2020, 40(13):1-11.
[2] Zhang J. Exploration and Reflection on School-Enterprise Cooperation in Higher Vocational Colleges under the Background of Industry-Education Integration[J]. Open Journal of Social Sciences, 2019, 07(1):66-74.
[3] Li C, Li G, Shi Y. Analysis of the Construction and Implementation of the New Mode of School-Enterprise Cooperation in Higher Vocational Colleges from the Perspective of Educational Reform[J]. Open Journal of Social Sciences, 2019, 07(11):246-253.
[4] Pang X. Experience in Building Comprehensive School-Enterprise Cooperation Model for "Double First-Class" Universities[J]. International Journal of Information and Education Technology, 2019, 9(11):805-809.
[5] Buczak A, Guven E. A Survey of Data Mining and Machine Learning Methods for Cyber Security Intrusion Detection[J]. IEEE Communications Surveys & Tutorials, 2017, 18(2):1153-1176.
[6] Zhou L, Pan S, Wang J, Vasilakos, Athanasios V. Machine Learning on Big Data: Opportunities and Challenges[J]. Neurocomputing, 2017, 237(MAY10):350-361.
[7] Coley C W, Barzilay R, Jaakkola T S, Green W H, Jensen K F. Prediction of Organic Reaction Outcomes Using Machine Learning[J]. Acs Central Science, 2017, 3(5):434-443.
[8] Hu X, Li S E, Yang Y. Advanced Machine Learning Approach for Lithium-Ion Battery State Estimation in Electric Vehicles[J]. IEEE Transactions on Transportation Electrification, 2017, 2(2):140-149.
[9] Lamperti F, Roventini A, Sani A. Agent-Based Model Calibration using Machine Learning Surrogates[J]. Journal of Economic Dynamics & Control, 2018, 90(MAY):366-389.
[10] Zheng T, Xie W, Xu L, He X, Zhang Y, You M, et al. A machine learning-based framework to identify type 2 diabetes through electronic health records[J]. International Journal of Medical Informatics, 2017, 97(jan.):120-127.
[11] Zhang J, Zhuo W, Verma N. In-Memory Computation of a Machine-Learning Classifier in a Standard 6T SRAM Array[J]. IEEE Journal of Solid-State Circuits, 2017, 52(4):1-10.
[12] Kolouri S, Park S R, Thorpe M, Slepcev D, Rohde G K. Optimal Mass Transport: Signal processing and machine-learning applications[J]. IEEE Signal Processing Magazine, 2017, 34(4):43-59.
[13] Butler K T, Davies D W, Hugh C, Olexandr I, Aron W. Machine learning for molecular and materials science[J]. Nature, 2018, 559(7715):547-555.
[14] Gastegger M, Behler J, Marquetand P. Machine Learning Molecular Dynamics for the Simulation of Infrared Spectra[J]. Chemical Science, 2017, 8(10):6924-6935.
[15] Fatima M, Pasha M. Survey of Machine Learning Algorithms for Disease Diagnostic[J]. Journal of Intelligent Learning Systems and Applications, 2017, 09(1):1-16.
[16] Goodfellow I, Mcdaniel P, Papernot N. Making Machine Learning Robust Against Adversarial Inputs[J]. Communications of the ACM, 2018, 61(7):56-66.
[17] Char D S, Shah N H, Magnus D. Implementing Machine Learning in Health Care - Addressing Ethical Challenges[J]. New England Journal of Medicine, 2018, 378(11):981-983.
[18] Zhang Y, Kim E A. Quantum Loop Topography for Machine Learning[J]. Physical review letters, 2017, 118(21):216401.1-216401.5.
[19] Wang J X, Wu J L, Xiao H. Physics-informed machine learning approach for reconstructing Reynolds stress modeling discrepancies based on DNS data[J]. Phys.rev.fluids, 2017, 2(3):1-22.
[20] Baydin A G, Pearlmutter B A, Radul A A, Siskind J M. Automatic differentiation in machine learning: A survey[J]. Journal of Machine Learning Research, 2018, 18(153):1-43.